Heating Piping & Air Conditioning

OCTOBER 1957

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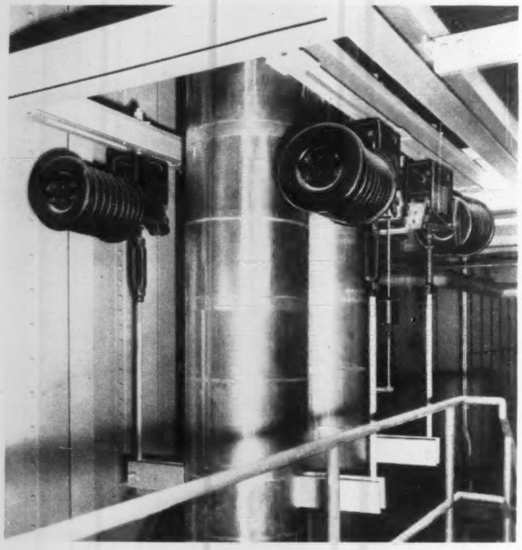
NDUSTRIAL • COMMERCIAL • INSTITUTIONAL • PUBLIC BUILDINGS

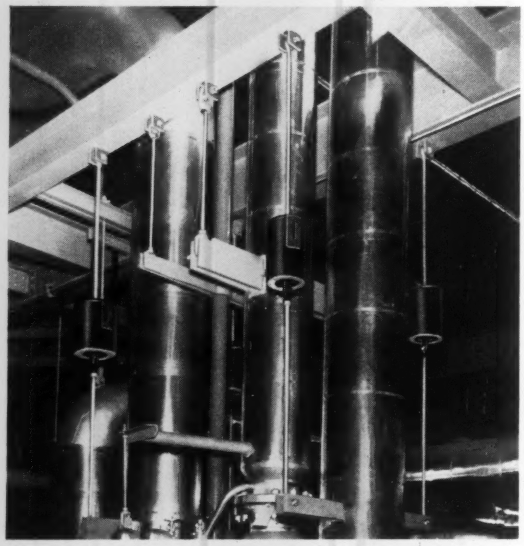
merican Society of Heating and Air-Conditioning Engineers Journal Section—page 129

Competition, Instruction Upgrade HPAC Skills...page 102

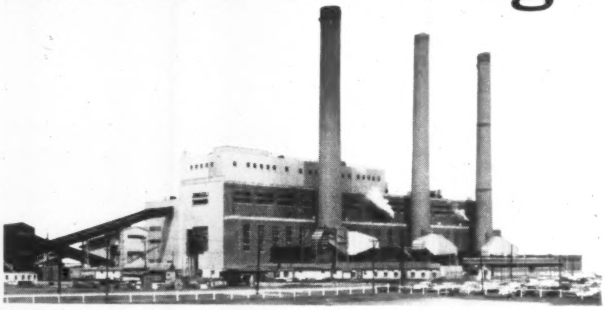
For Indianapolis Power & Light



Grinnell Model R Constant-Support Hangers on cold reheat riser piping. Constancy of support which hangers provide is mathematically perfect for all positions of travel. Note low headroom requirement. Hangers available in sizes for loads ranging from 30 lbs. to 32,260 lbs., with travels up to 12 inches.



Grinnell B-268 Pre-Engineered Spring Hangers on boiler feed piping. Patented precompression feature assures operation of spring within its proper working range. Maximum variation in supporting force per ½" of deflection is 10½% of rated capacity — in all sizes. Available in 21 sizes for loads ranging from 50 lbs. to 28,200 lbs.



H. T. Pritchard Generating Station, Indianapolis Power & Light Company

Pipe Hangers by Grinnell

Six generator units have been built at H. T. Pritchard Station of Indianapolis Power and Light Company since 1947, adding up to a total station capacity of 376,000 kw. In each unit built at this station, just as in every new station constructed by this company, Grinnell Pipe Hangers and Supports have been used exclusively.*

There's good reason why major power companies like Indianapolis Power & Light look to "America's #1 Supplier of Pipe Hangers and Supports." A volume producer of pipe hangers, Grinnell backs up this advantage with an efficient coast-to-coast distribution system of warehouses and jobbers. You can depend on Grinnell for quick deliveries. In fact, even complex hanger requirements often can be met with hanger assemblies right off the shelf. This not only saves you time — but it can save you money, by cutting down on the number of special items which must be manufactured.

Benefit from expert knowledge gained during more than a century of piping experience. On your next piping job, specify Grinnell.

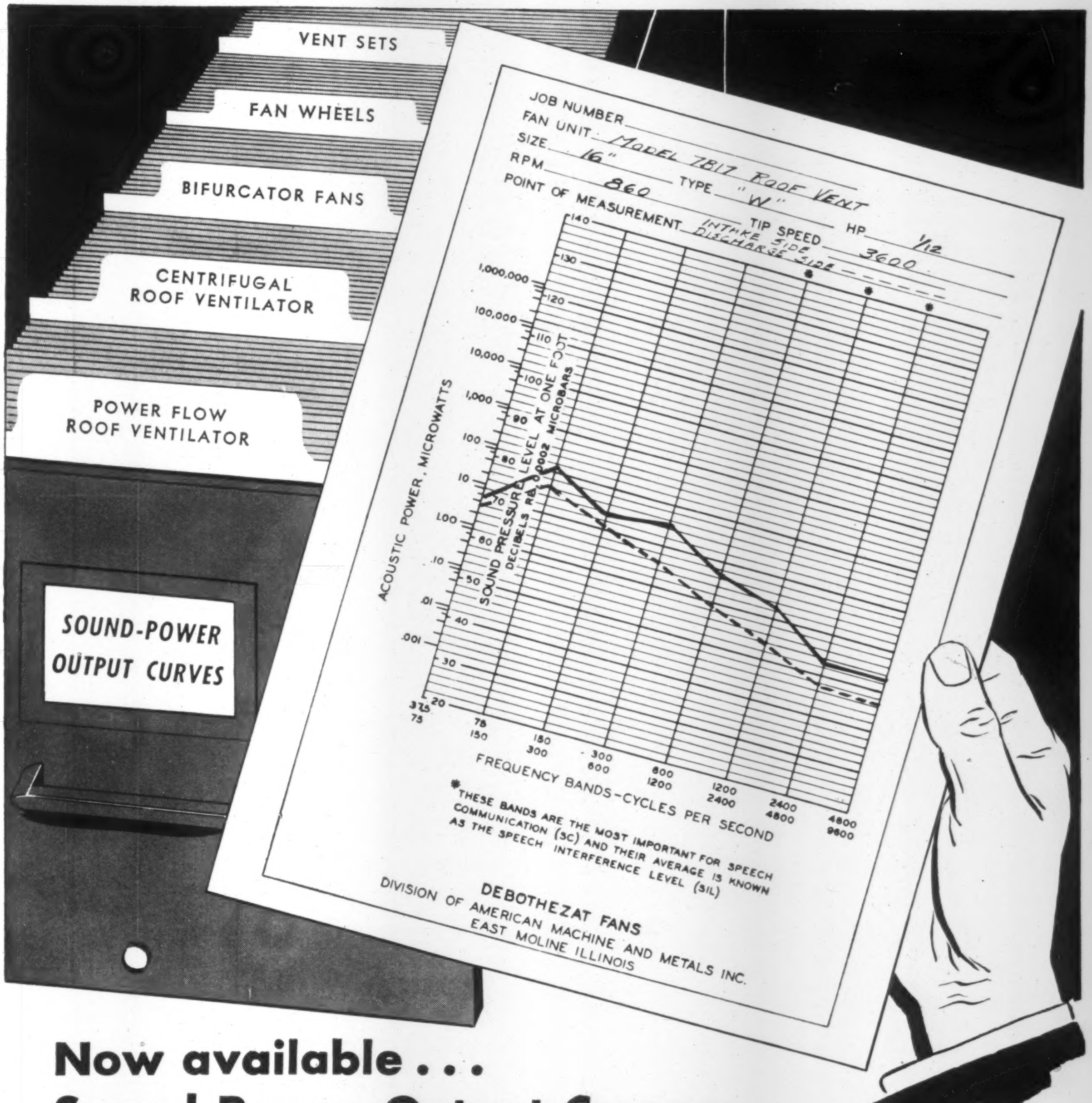
*Work done in collaboration with Gibbs & Hill, Inc., N.Y.C.

GRINNELL

AMERICA'S #1 SUPPLIER OF PIPE HANGERS AND SUPPORTS

Grinnell Company, Inc., Providence, Rhode Island **Coast-to-Coast Network of Branch Warehouses and Distributors**

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems


VENT SETS
FAN WHEELS
BIFURCATOR FANS
CENTRIFUGAL ROOF VENTILATOR
POWER FLOW ROOF VENTILATOR
SOUND-POWER OUTPUT CURVES

JOB NUMBER
FAN UNIT MODEL 7817 ROOF VENT
SIZE 16"
RPM 860 TYPE "W"
POINT OF MEASUREMENT INTAKE SIDE ——— DISCHARGE SIDE - - - - TIP SPEED 3600 HP 1/12

ACOUSTIC POWER, MICROWATTS
1,000,000
100,000
10,000
1,000
100
10
1.00
.10
.01
.001
SOUND PRESSURE LEVEL AT ONE FOOT
DECIBELS RE .0002 MICROBARS
140
130
120
110
100
90
80
70
60
50
40
30
20
37.5
75
75
150
150
300
300
600
600
1200
1200
2400
2400
4800
4800
9600
FREQUENCY BANDS–CYCLES PER SECOND

*THESE BANDS ARE THE MOST IMPORTANT FOR SPEECH COMMUNICATION (SC) AND THEIR AVERAGE IS KNOWN AS THE SPEECH INTERFERENCE LEVEL (SIL)

DEBOTHEZAT FANS
DIVISION OF AMERICAN MACHINE AND METALS INC.
EAST MOLINE ILLINOIS

Now available . . .
Sound-Power Output Curves by Octave Bands for predicting fan noise

All DeBothezat fans are rated for noise on both the inlet and outlet sides.

These ratings are given in microwatts sound power and decibel sound pressure levels in each of 8 octave bands of frequencies, measured separately. Ratings are established by actual scientific tests conducted in DeBothezat's own reverberation rooms designed and calibrated by Armour Research Foundation.

This data is available on any size and type DeBothezat fan unit you may be interested in. And remember, DeBothezat fans' sound power ratings are based on actual reverberation room tests. Ask your DeBothezat Sales Engineer for complete information.

De Bothezat FANS
A DIVISION OF
American Machine and Metals, Inc.
EAST MOLINE, ILLINOIS

IN CANADA: Represented by DOUGLAS ENGINEERING CO., Ltd., Toronto • Montreal

The self-fluxing nature of wrought iron enables this welder to easily produce sound, durable welds along these chilled water lines at new Fireman's Fund Building in San Francisco.

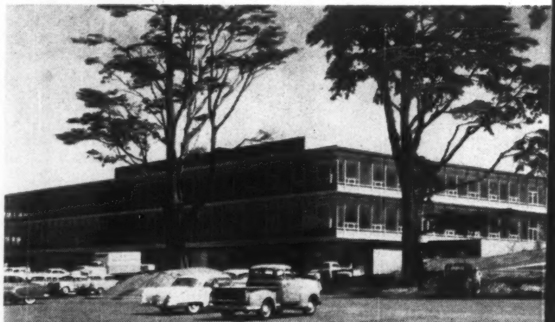
Wrought Iron adds piping permanence to new Fireman's Fund Insurance Building

The new $4½ million glass-walled home office of the Fireman's Fund Insurance Company is piped for permanence.

Designers made sure of this when they specified wrought iron pipe for condenser water and chilled water lines for air conditioning, and for underground steam lines, steam condensate lines, underground gas lines and downspouts.

Wrought iron's thrift over ordinary piping materials stems from a property feature—thousands of glasslike iron silicate fibers entrained in the pure base metal. This defense against corrosion is unique with wrought iron. No other material can duplicate it. And it pays off in low cost per-year-of-service.

If you have an installation problem or need fabrication data on wrought iron, write our Engineering Service Department for help. A. M. Byers Company, Clark Building, Pittsburgh 22, Pennsylvania.



New Home Office Building, Fireman's Fund Insurance Company
Architect: Edward B. Page
Mechanical Engineer: R. Rolleston West
General Contractor: MacDonald, Young & Nelson

BYERS Wrought Iron Tubular and Hot Rolled Products

ALSO ELECTRIC FURNACE QUALITY STEEL PRODUCTS

Corrosion costs you more than Wrought Iron

Heating Piping & Air Conditioning

Vol. 29 No. 10

(With which is merged the Aerologist)

DESIGN, INSTALLATION, OPERATION AND MAINTENANCE IN INDUSTRIAL, COMMERCIAL, INSTITUTIONAL AND PUBLIC BUILDINGS

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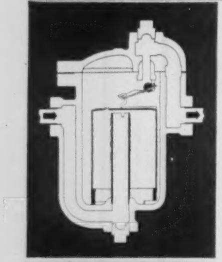
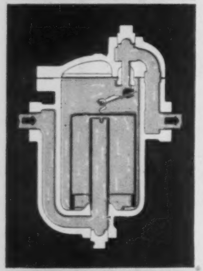
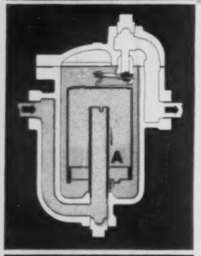
How Armstrong Trap Design Improves Plant Efficiency . . .



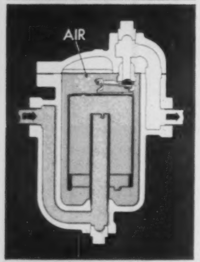
1 When trap is first installed, the inverted bucket is down and the valve is wide open. The large clearance between valve and seat minimizes restriction to condensate flow, contributing to large capacity.



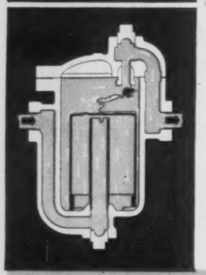
2 When steam is turned on, note how condensate (solid color) flows down between bucket and trap body, then up and out through orifice. Dirt is held in suspension and washed out when valve opens.



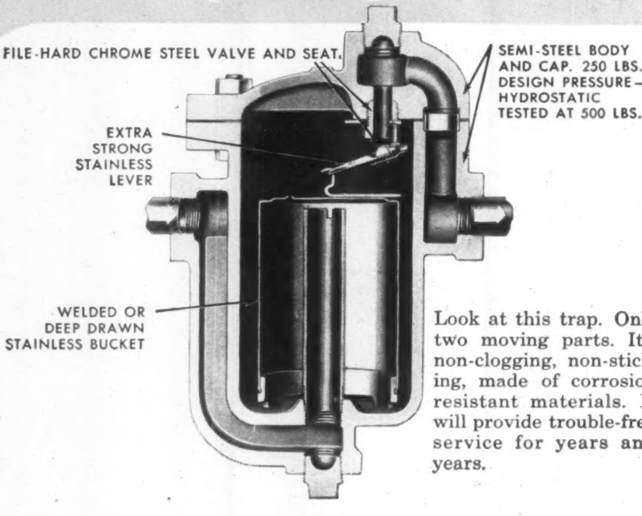
3 When steam reaching trap displaces less than ⅔ of the water in the bucket, it floats, closing the valve. Generous safety margin (dimension A) insures that steam will never reach trap orifice.



4 When more condensate enters trap, the bucket loses buoyancy and pulls on valve lever. (Note how incoming air passes through bucket vent and collects at top of trap, awaiting discharge.)



5 When weight of bucket times leverage overcomes pressure on valve, trap opens, creating momentary pressure drop that "pumps" condensate and non-condensibles from unit being drained.


FILE-HARD CHROME STEEL VALVE AND SEAT.
EXTRA STRONG STAINLESS LEVER
WELDED OR DEEP DRAWN STAINLESS BUCKET
SEMI-STEEL BODY AND CAP. 250 LBS. DESIGN PRESSURE—HYDROSTATIC TESTED AT 500 LBS.

Look at this trap. Only two moving parts. It's non-clogging, non-sticking, made of corrosion resistant materials. It will provide trouble-free service for years and years.

Time-Tested Inverted Bucket Principle Provides Five Cost-Reducing Benefits:

The modern Armstrong Trap is unsurpassed in these five major contributions to plant operating efficiency:

1. **Fast heat-up**—thanks to large condensate and air handling capacity. On batch or cycled production, you get maximum output per day.
2. **High heat transfer rate**—quick opening creates a sudden surge of condensate and air from the unit being drained. This pumping action prevents stratification of incondensibles and insures complete drainage. Laboratory and field tests prove it produces higher heat transfer than is otherwise possible.
3. **Low Fuel Consumption**—non-productive radiation losses are minimized because condensate is discharged at steam temperature as fast as it accumulates in the trap—you get more production per hour and per unit of fuel. And, there is no steam loss through the trap orifice.
4. **Continuity of operation**—the trap always opens for condensate; the simple, sturdy, self-cleaning mechanism insures continuous operation between inspections without interruption of processing.
5. **Low Maintenance**—no trap has ever gained so enviable a record for trouble-free service—ask anyone who has kept records.

Free: Steam Trap Book—
44 helpful pages on trap selection, installation maintenance, physical data and prices. Call your local Armstrong Representative or Distributor, or write:

ARMSTRONG STEAM TRAP BOOK

ARMSTRONG MACHINE WORKS
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ARMSTRONG *Inverted Bucket* **STEAM TRAPS**

This filter
has one job to do

. . . but air filtering isn't so simple!

We frankly don't know which cigarette filter best meets this one requirement—removal of irritants from smoke. We do know this: no one *air* filter can possibly meet the *widely varied* clean air requirements of business and industry.

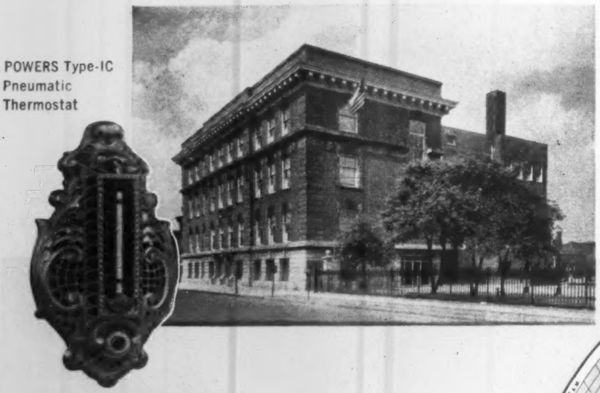
That's why AAF—and *only* AAF—makes *all* types. Regardless of your specific needs, you can be sure that AAF will recommend the one right air filter that is best for you.

A talk with your local AAF representative will show you how this complete-line approach benefits you—in dollars and results!

American Air Filter
COMPANY, INC.
373 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

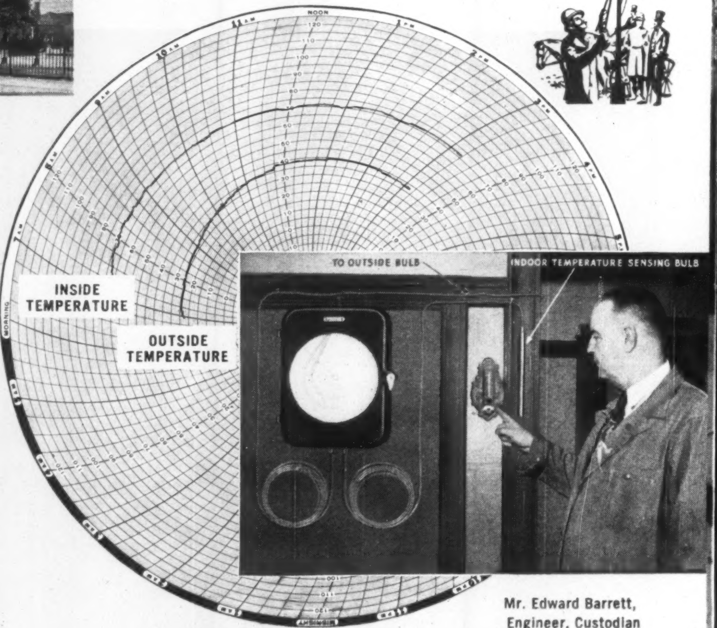
See AAF Product Advertisement on page 56

POWERS Type-IC Pneumatic Thermostat



Since the Gaslight Era...

56 Year Old Powers Control System still gives dependable performance shown on temperature charts below

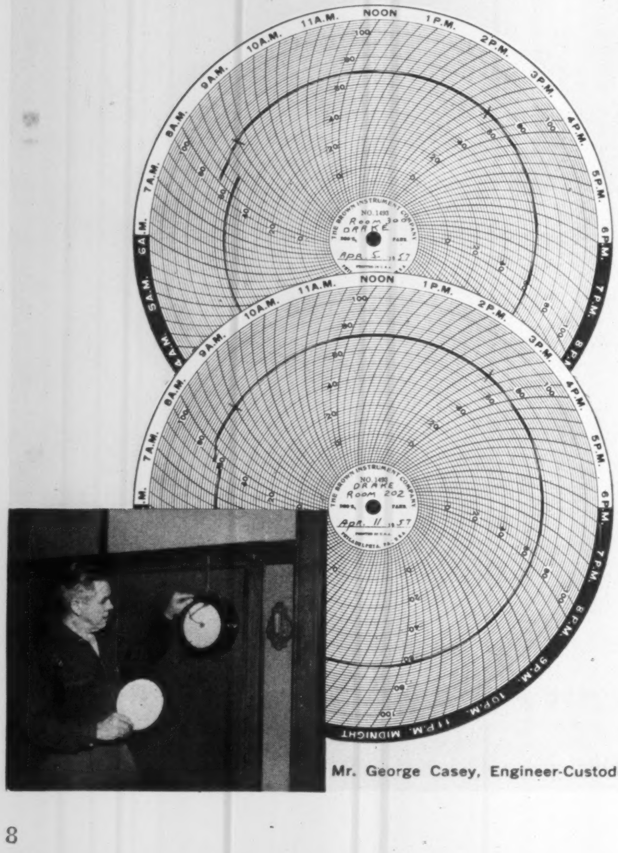


Mr. Edward Barrett, Engineer, Custodian

in 1901 The old DRAKE SCHOOL, built at the turn of the century, was one of Chicago's best. It is located in the famed Prairie Avenue district and was completed in January 1901. Temperature of the forced warm air heating and ventilating was regulated by a

POWERS gradual acting Pneumatic Control System

Like earlier Powers systems installed in Chicago's schools, in 1895-96, the thermostats in each room were unique. Their **Gradual** action in controlling the mixing dampers that supplied tempered air to each classroom was a decided improvement over positive-on-off type of control widely used at that time.



Mr. George Casey, Engineer-Custodian.

in 1950 **On its 49th Birthday** recording thermometer charts like the one above showed the good control obtained with this old Powers system.

in 1957 **On its 56th Birthday**—still not acting its age—Powers control produced temperature recording charts like those at the left. All charts on this page were made in rooms regulated by Powers Type IC Pneumatic Thermostats.

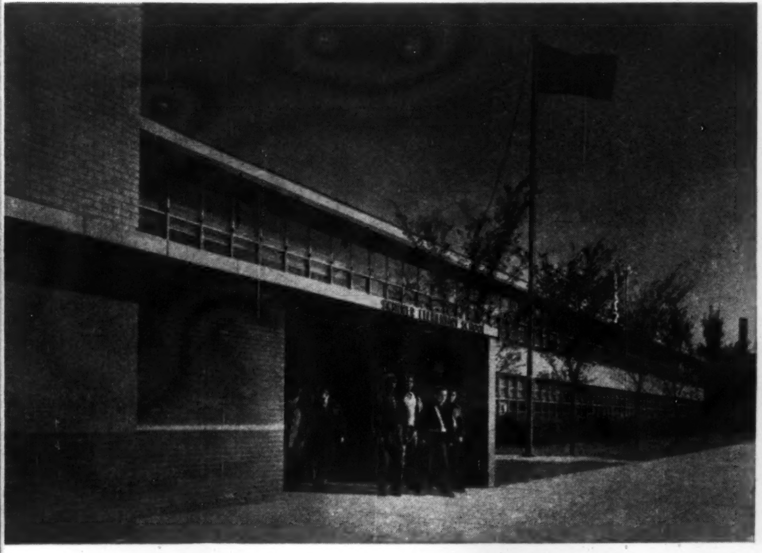
Will the Temperature Control Systems You are Specifying or Buying Today give better, or as good control as this 25 to 50 years from now? Users of Powers control report such performance with low cost for upkeep.

Taxpayers **get their money's worth.** The charts show **No Fuel is Wasted** due to OVER-heating. Dependable Powers Control combined with the maintenance program of the Chicago School system team up to provide greater classroom comfort, fuel economy and performance records like the one cited above.

- **Only two of many Chicago schools controlled by Powers are illustrated here.**

...Chicago Taxpayers benefited from the Economy of

POWERS quality systems of Pneumatic TEMPERATURE CONTROL



SKINNER ELEMENTARY SCHOOL, CHICAGO

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General Supt. of Schools

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Associate Supt.
In Charge of Operation Services

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Asst. Supt. in Charge of Plant Engineering

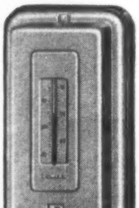
The NEW and FORWARD LOOK in Chicago Schools is exemplified by the new colorful Skinner School

A Favorable Environment for Learning. Located in a drab old neighborhood the pleasing use of colored glazed brick and other materials for exterior and interior, plus many contemporary features, helps teachers operate at peak efficiency and aids pupils desire for learning.

In This Well Designed 35 Room School are 26 classrooms, two kindergartens, library, lunch room, home economics, clinic and adjustment rooms, gymnasium and offices.

Powers Control Provides Thermal Comfort and Fuel Economy. Thermostat in each room regulates reheat coil in ventilating duct. Forced hot water heating in concealed finned radiation is controlled by a Powers MASTROL system.

Are you Planning a New Building? Ask your architect or engineer to include a Powers Quality system of pneumatic control. You'll help insure utmost comfort, fuel economy and lowest cost for upkeep.



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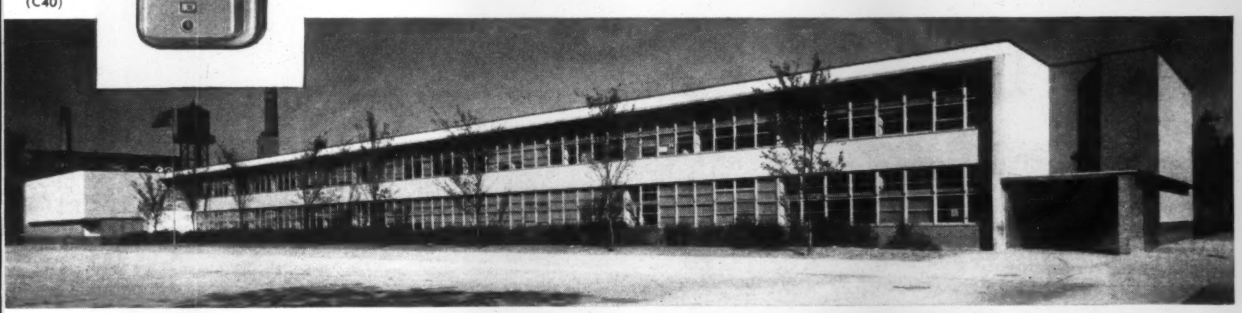

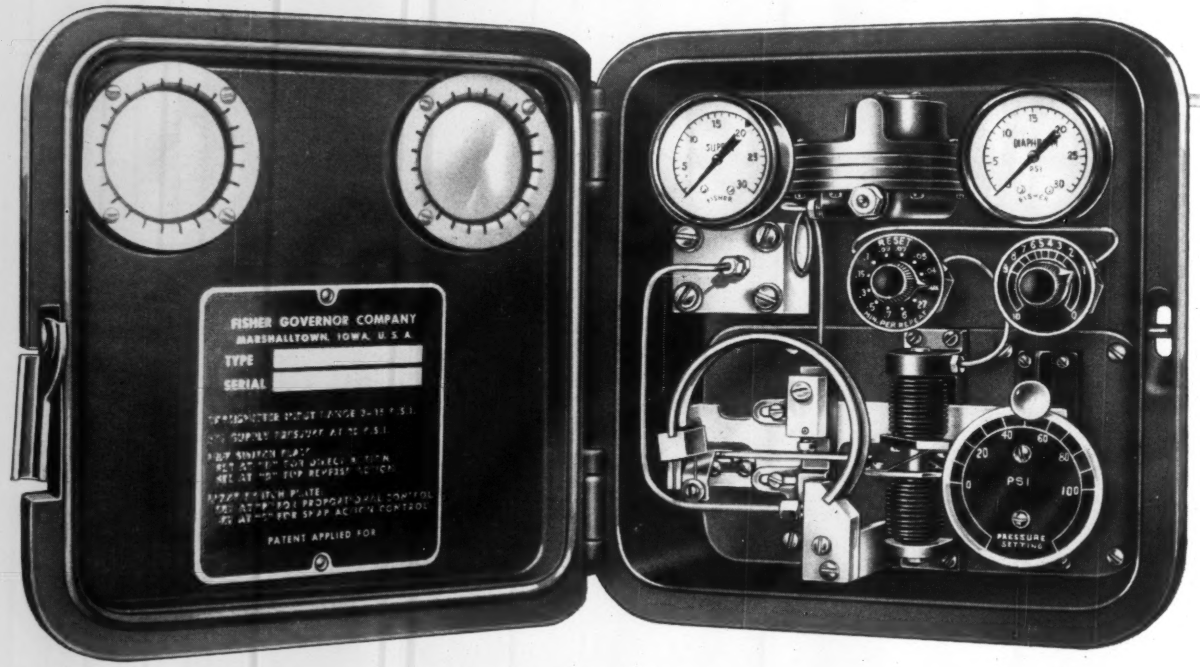
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MARSHALLTOWN, IOWA, U.S.A.
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PATENT APPLIED FOR
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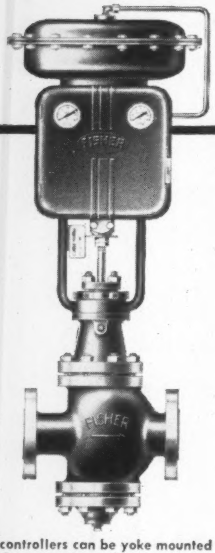
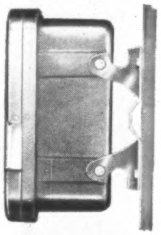
RESET
MIN PER REPEAT
PSI
PRESSURE SETTING


FISHER
FISHER

Any of the Wizard controllers can be yoke mounted on a diaphragm control valve to make a compact pilot operated pressure regulator as shown above. All Wizards are normally supplied with an operating medium air set which filters and reduces supply pressure of 25 to 250 psi to constant pressure of 20 psi for 3 to 15 psi, or 35 psi for 6 to 30 psi operation.

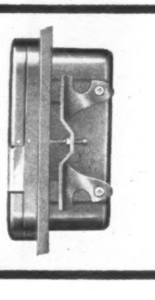
SURFACE MOUNTING

The Wizard can be mounted on the surface of a wall or any stable surface. A special mounting bracket is provided and any type of screw or bolt suitable for the mounting surface may be used.



FLUSH MOUNTING

By turning the bracket around that is provided for surface mounting, any Wizard can be mounted flush to a panel.



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WIZARD II

PRESSURE CONTROLLER

For over a quarter century, the name "Wizard" has become a byword as the pressure controller that is accurate, dependable and simple to operate in all types of industry.

Now, the WIZARD II takes over to meet the demands of modern, complex control systems requiring closer control. The WIZARD II retains all of the basic simplicity, accuracy and dependability of the Wizard 4100U, plus a number of new components. The WIZARD II is in a waterproof aluminum die-cast case and cover with ¼″ tapped vent for gas service. With the addition of a few parts, the basic proportional controller can be converted to: (1) two-position action or "Snap Action", (2) pressure transmitter, (3) controller with remote set adjustment, (4) proportional plus reset response. The WIZARD II can be changed from direct to reverse action or vice versa without additional parts.

The superior subassembly construction stresses simplicity and compactness. Each subassembly is assembled and calibrated prior to mounting in the case. All Series 4150 Wizards can be supplied for remote set adjustment for changing the pressure setting from a location away from the Wizard controller.

Careful and exhaustive tests have conclusively proved that the WIZARD II measures up to the rigid Fisher standards.

A completely descriptive and illustrated bulletin on the WIZARD II is yours for the asking. Write today for Bulletin No. D-4150.

FISHER GOVERNOR COMPANY
Marshalltown, Iowa / Woodstock, Ontario

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Fast 2-step system delivers J&L steel products through your local

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He's listed in your
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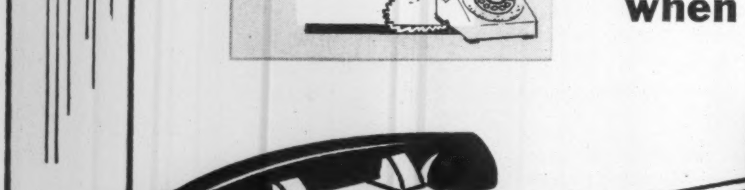
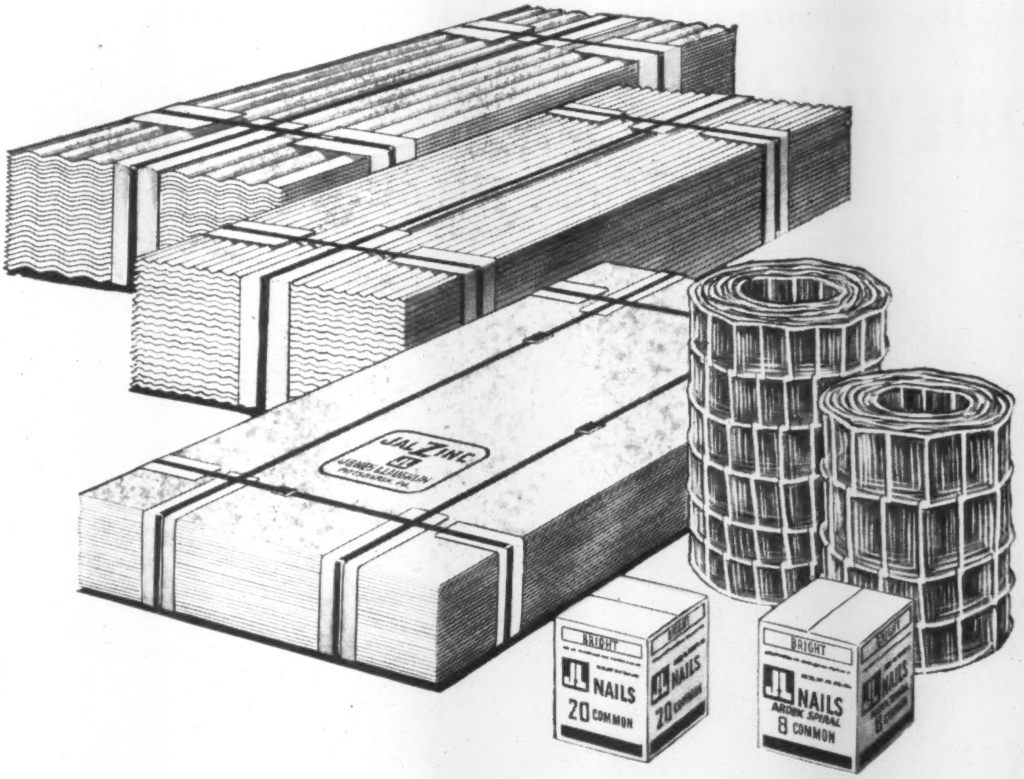
...and ready
with complete stocks.

Lift your phone
and place your order...
for delivery
when you need it.

J&L STEEL

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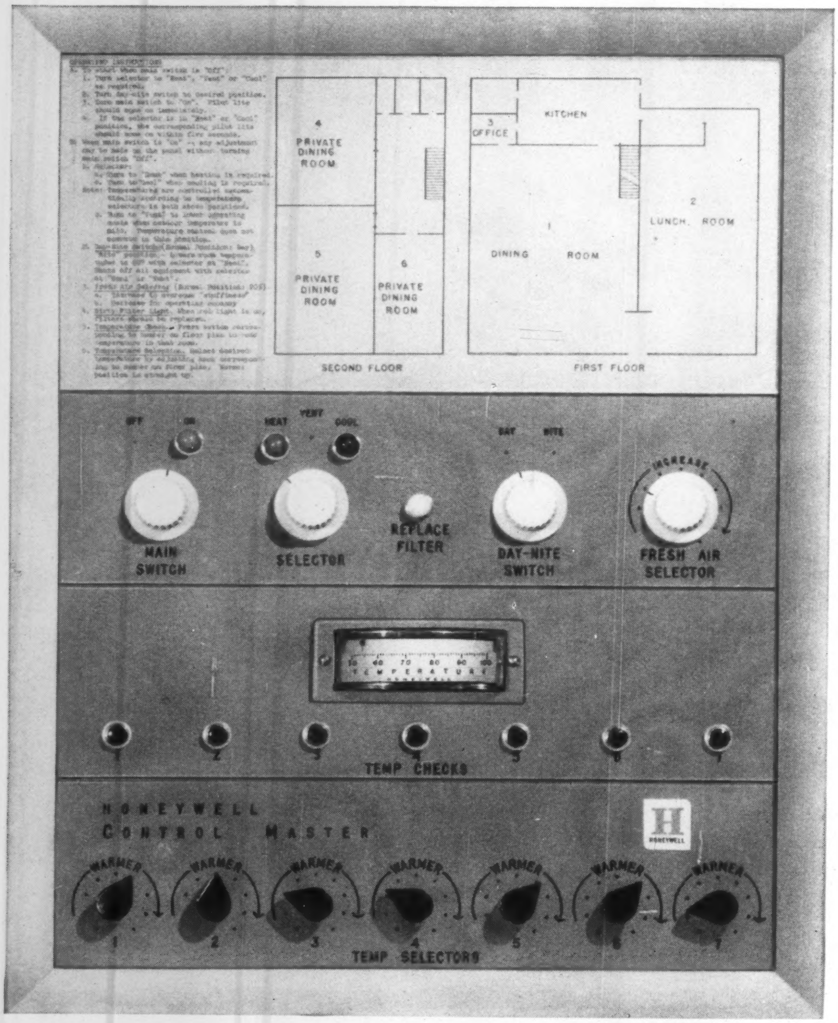
NEW . . . for restaurants, stores, offices

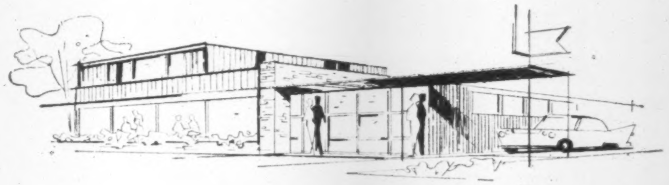
HONEYWELL CONTROL MASTER*


PRIVATE DINING ROOM
KITCHEN
OFFICE
LUNCH. ROOM
DINING ROOM
SECOND FLOOR
FIRST FLOOR
MAIN SWITCH
SELECTOR
REPLACE FILTER
DAY-NITE SWITCH
FRESH AIR SELECTOR
INCREASE
TEMPERATURE
TEMP CHECKS
HONEYWELL CONTROL MASTER
WARMER
TEMP SELECTORS

Typical panel. This one is for a restaurant. It could as easily be for any other small commercial building. Note simplicity, self-explanatory features that make it ideal for owner-manager operation. Operating instructions are elementary, floor plan is self-explanatory, controls, buttons, dials and lights are all clearly labeled.

Control leadership through advanced engineering—research

FOR SMALL COMMERCIAL BUILDINGS



New panel centralizes and simplifies air conditioning operating adjustments so owner or manager can handle with ease

THE NEW Honeywell panel you see pictured here should be a real boon to your client, the small building owner.

For it gives him, in a panel he can understand and operate himself, complete control over building comfort.

Standing before the Honeywell Control Master he can read temperatures in every part of his building by pushing the proper button. And he can adjust them by turning a dial. The same goes for fresh air damper positioning and basic system adjustments.

If he's ever in doubt, the simple operating instructions and zone diagram are there for him to review.

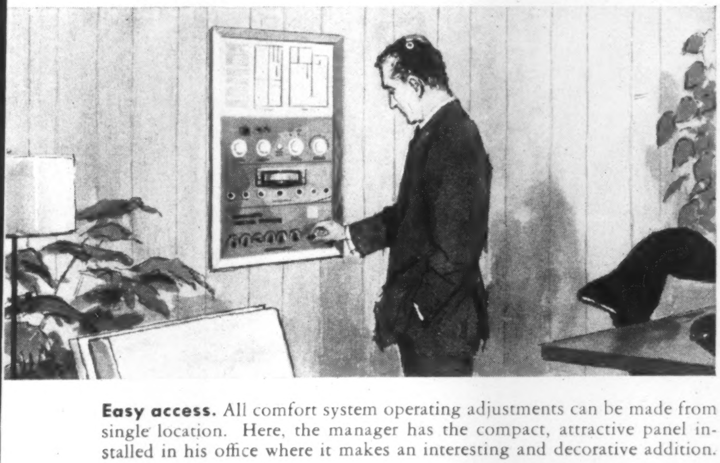
For the first time your client can operate his air conditioning system efficiently and effectively—providing the temperature level he wishes. He no longer has to put up with expensive overcooling on mild days with light occupancy, or uncomfortably warm conditions due to overcrowding. He can anticipate busy and slack hours.

Important to you during the guarantee period and to your client later is the reduction in service calls because of the ease of adjustment and easily understood controls. Also, you won't have to make several trips to explain the system operation and controls.

The Control Master is made possible by the characteristics of Honeywell Electronic Controls with all of their superiority and advantages.

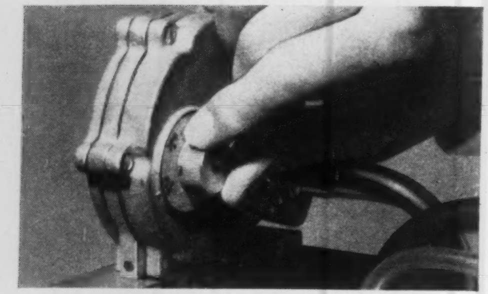
For further information about the Control Master and other Honeywell central control panels, call your local Honeywell office. Or write to Minneapolis-Honeywell, Dept. HA-10-247, Minneapolis 8, Minn.

**Trademark*



Easy access. All comfort system operating adjustments can be made from single location. Here, the manager has the compact, attractive panel installed in his office where it makes an interesting and decorative addition.

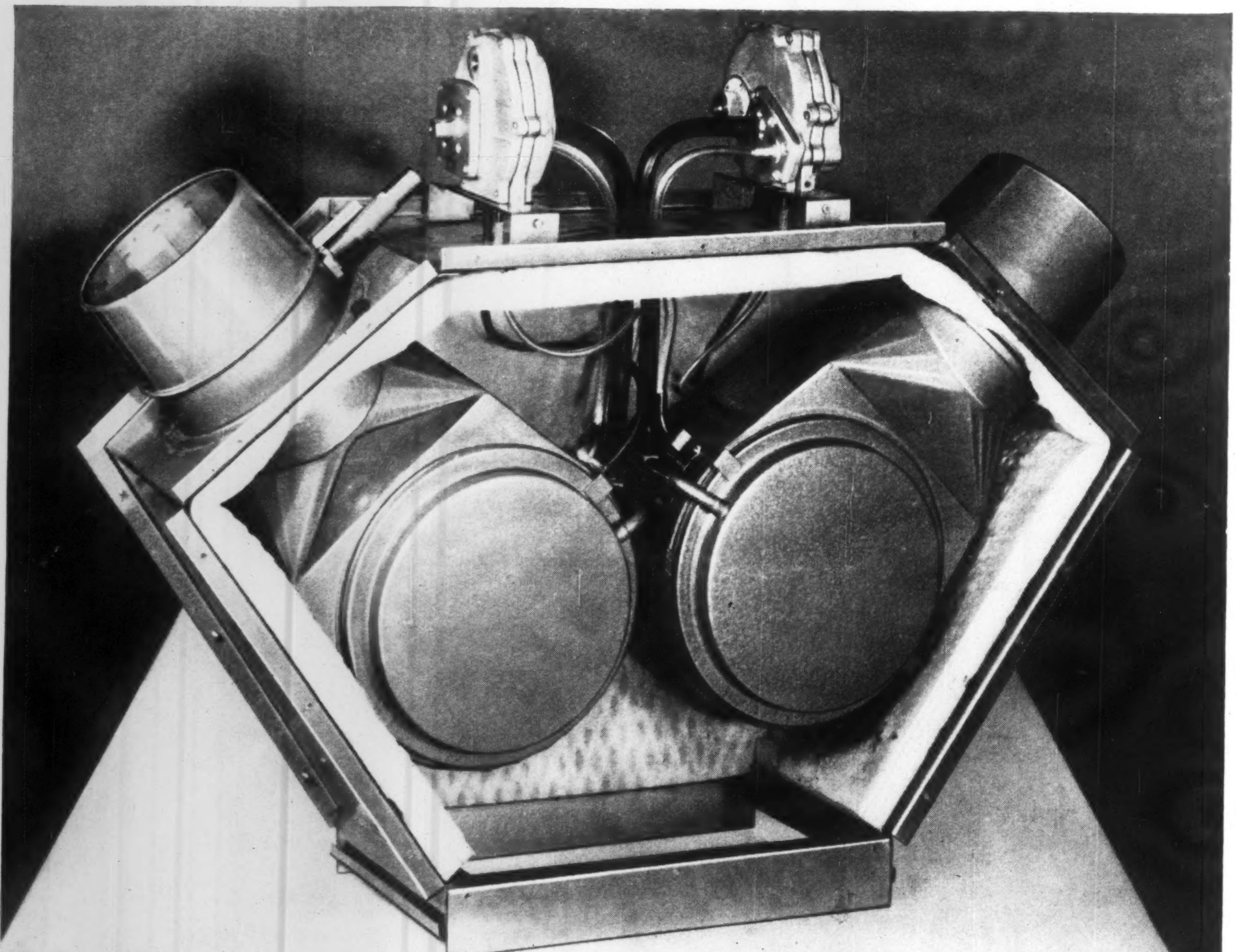
For news about another major Honeywell contribution to indoor climate, turn the page. ⟶



Calibrated dial air balancing is the key to the superior performance of the Honeywell High Velocity Air Blender. You adjust dial only once, need never recalibrate again. Once balanced, comfort control is in the hands of the system thermostats.

Dial Air Balancing

NEW HONEYWELL HIGH VELOCITY



Fits any mixing box. The configuration you see here is but one of the many possible for ceiling units. Also, it's now available in nearly every under-the-window type unit. From the new Honeywell Blender you can expect controlled volume of air, constant CFM, long valve life and simplified control. The thermostat in the system controls temperature by controlling the volume of hot air passed by the hot duct. At the same time a flow regulator provides a constant hot air volume for a given thermostat signal under variations in supply duct pressures. A constant total flow is provided by a total flow regulator which operates the cold air valve to make up the difference between hot flow and desired total flow.

Control leadership through advanced engineering—research

AIR BLENDER SOLVES DUAL-DUCT DISTRIBUTION PROBLEMS

Provides constant delivered air volume, needs no recalibration when you add to system

WITH THE new Honeywell Air Blender your clients get the level of comfort they want—on the simple call of the room thermostat.

They get this easily, because the Honeywell Air Blender combines temperature and volume control in one unit.

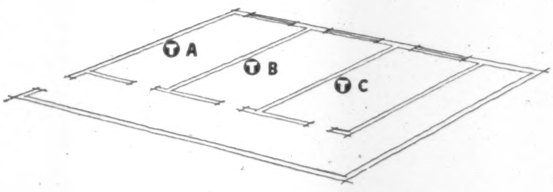
And comfort doesn't come at the expense of some other room. It comes from the system. *One room no longer "robs" another of comfort.*

Besides providing constant delivered air volume, the Honeywell Air Blender takes well to change. With Dial Air Balancing you can add to the system without having to recalibrate distribution points that may be scattered widely—especially valuable in floor by floor modernization or on new construction.

Self-powered, the Honeywell Air Blender uses the pressure of the air it is controlling to actuate the diaphragm—its only moving part. Such simplicity makes possible long life and trouble-free performance.

For further information about the Honeywell High Velocity Air Blender and other Honeywell heating and air conditioning products, call your local Honeywell office. Or write to Minneapolis-Honeywell, Dept. HA-10-247, Minneapolis 8, Minnesota.

No room "robs" comfort from another



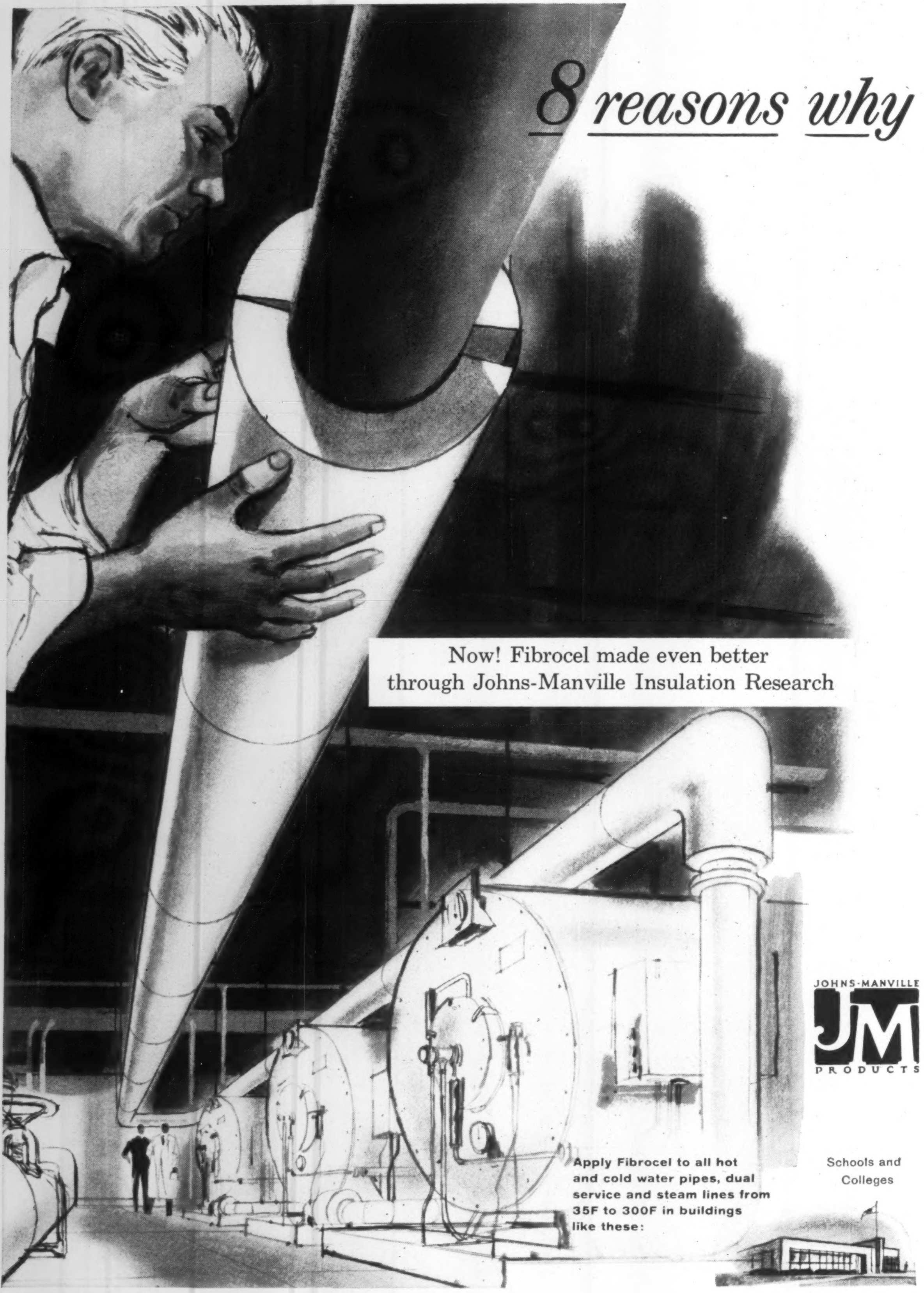
For the first time in high velocity air handling history you can design a system where adjustment in one room doesn't upset comfort balance in others. Thus, in a typical office, adjustment in area A does not rob comfort from B or C. Neither delivered air volume, nor the ratio of hot to cold air is affected in B or C. This is one of the reasons why it's wise to design with the new Honeywell Air Blender in mind.

The "new" look in thermostats that's appearing on walls of commercial buildings throughout America. New design *inside* gives closer control, vastly superior performance.

Only Honeywell gives you all four—pneumatic, electric, electronic, instruments.

Honeywell

H HONEYWELL First in Controls



8 reasons why

Now! Fibrocel made even better through Johns-Manville Insulation Research

JOHNS-MANVILLE
JM
PRODUCTS

Apply Fibrocel to all hot and cold water pipes, dual service and steam lines from 35F to 300F in buildings like these:

Schools and Colleges

FIBROCEL® PIPE INSULATION

is the new standard for all commercial service

J-M Fibrocel has been the outstanding insulation in the low pressure field ever since its introduction three years ago. Now thanks to new findings by Johns-Manville's insulation research, it is even better in many ways. Today you get all these advantages in Fibrocel insulation:

Cleaner, sharper edges . . . Tight, snug-fitting edges provide better heat control, smoother appearance.

Smoother, harder surface . . . Normal abrasion and abuse in service cannot damage surface.

Firmer, stronger structure . . . Fibrocel resists compression and abuse. Gives back-up protection against puncture of jacket or vapor seal.

Heavier, smoother canvas . . . New canvas covering provides maximum protection and appearance.

plus these features always associated with Fibrocel:

No shrinkage . . . Joints stay tight . . . no unsightly gaps or costly repairs.

Easy to install . . . Fibrocel is light and easy to handle, is readily cut with a knife.

High thermal effectiveness . . . Tiny particles of silica are exploded and expanded to form a cellular structure of heat-trapping dead air spaces.

Permanent . . . Fibrocel is impervious to flame, rot, odor and vermin attack.

Write for free illustrated 8-page folder, IN-155A. It includes physical properties, insulating characteristics, sizes and thicknesses available. Address Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

JOHNS-MANVILLE INSULATIONS

FOR LASTING THERMAL EFFICIENCY

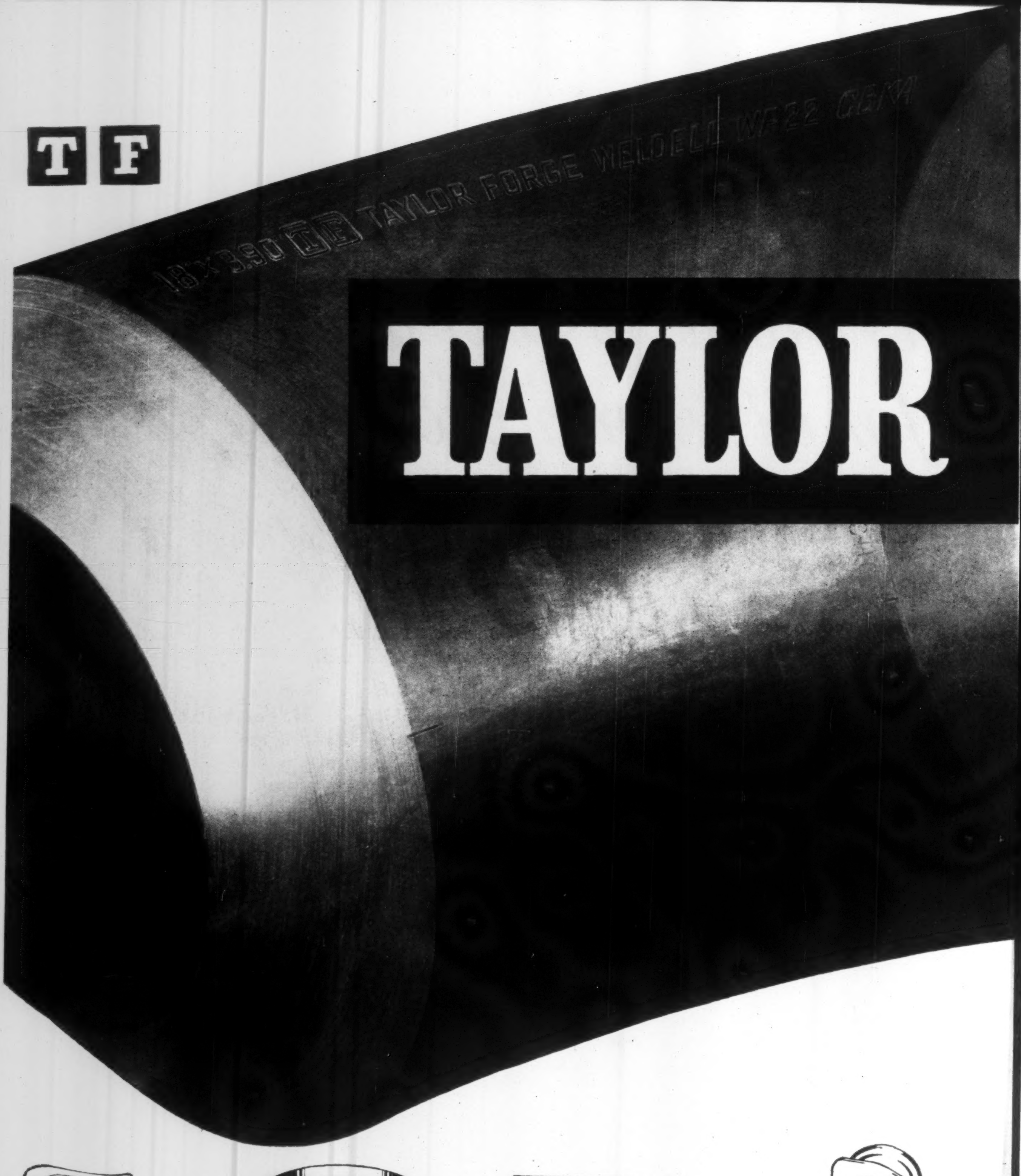
A.I.A. File No. 37-D-1-2

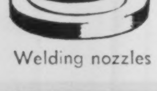
Hotels and Apartment Buildings

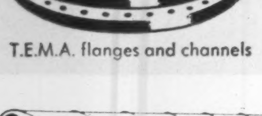
Stores and Warehouses

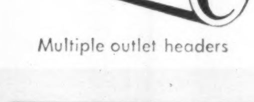
Office Buildings

Hospitals and Institutions

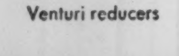

T F
18" x 3.90 TF TAYLOR FORGE WELDELL WP22
TAYLOR

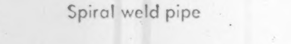

Welding nozzles

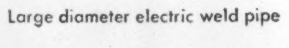

T.E.M.A. flanges and channels

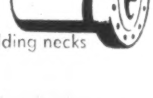

Multiple outlet headers

Production forgings


Venturi reducers


Spiral weld pipe


Large diameter electric weld pipe


Welding necks

For utmost value

FORGE

Welding Fittings
and
Forged Flanges

Whether it's a "heavyweight", like the big special wall thickness WeldELL pictured here, or a Schedule 5S Stainless Steel "lightweight"—in fact *any* thickness, size or type of Welding Fitting or Forged Flange—you can be sure of utmost value if it's made by Taylor Forge.

In 57 years of specialized forging experience we've learned how to make metals do precisely what we want them to do . . . how to form them to exact dimensions . . . how to control grain flow so as to put extra strength where it is needed . . . how to maintain great accuracy and finest quality in everything we make from the smallest to the largest unit.

All of this is just another way of emphasizing the fact that Taylor Forge Welding Fittings and Forged Flanges can be depended upon to meet your most exacting requirements . . . to provide utmost value.

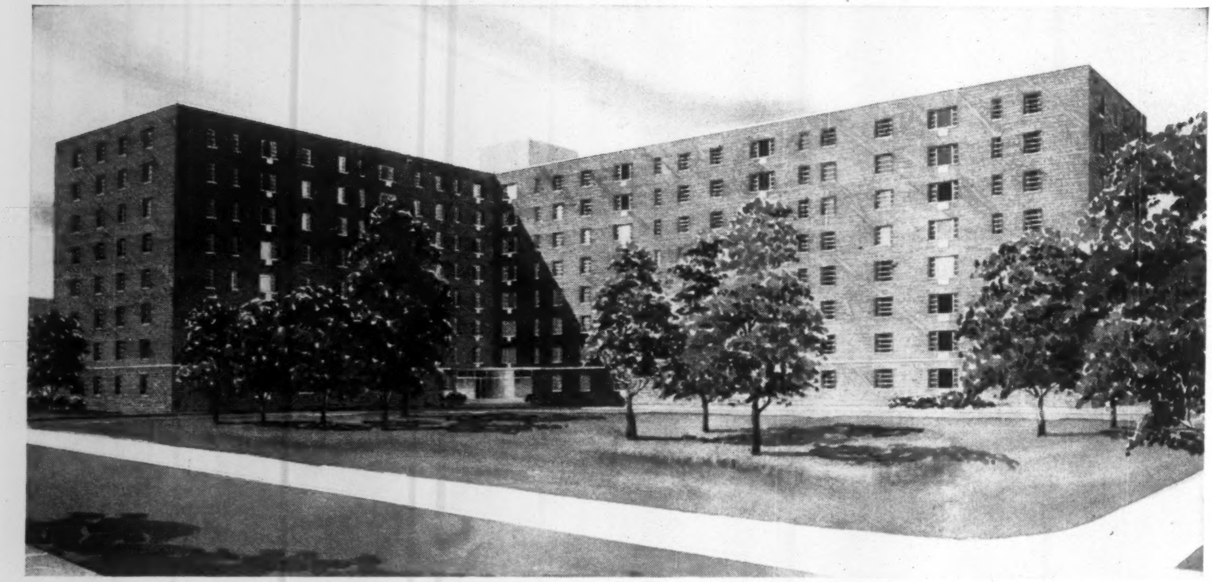
So . . . remember . . . for everything in Welding Fittings and Forged Flanges . . . every size, type, thickness or pressure rating . . . every forgeable material . . . it pays to turn to Taylor Forge . . .

TRADITIONALLY DEPENDABLE

For prompt, efficient and reliable service, patronize your local Taylor Forge Distributor.

Taylor Forge & Pipe Works

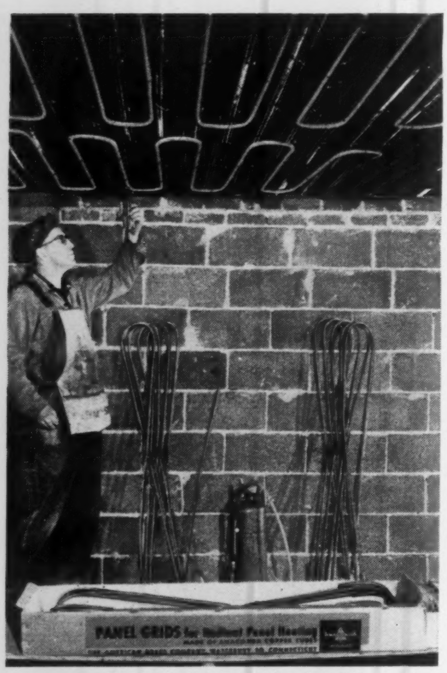
General Offices and Works: P. O. Box 485, Chicago 90, Illinois
Plants at: Carnegie, Pa., Gary, Ind., Houston, Texas, Fontana, Calif.,
Hamilton, Ont., Canada
District Sales Offices: New York, Boston, Philadelphia, Pittsburgh, Atlanta, Chicago,
Houston, Tulsa, Los Angeles, San Francisco, Seattle, Toronto, Calgary, Montreal.



The Kenmawr Apartments is Pittsburgh's second-largest modern apartment building. General contractor, Larson Construction Co.; heating contractor, Steel City Piping Co.; Anaconda distributor, Crane Co., Pittsburgh, Pa.

New 240-Unit Pittsburgh apartment gets "Sunshine Warmth"

with ANACONDA pre-formed Copper Tube PANEL GRIDS



Approximately 3200 Anaconda Panel Grids were installed in ceilings throughout the Kenmawr Apartments. The PG's came to the job in handy cartons shown, ready to open out and fasten to the metal lath by tie wires.

The ease of installing PG's® was a big factor in adding radiant panel heating to the long list of modern comfort and convenience features in the new Kenmawr Apartments in Pittsburgh.

John O'Farrell, partner of Steel City Piping Co., Pittsburgh, heating contractor on the project, suggested a radiant heating system because of his previous experience with Anaconda Panel Grids. He knew that the savings provided by these ready-to-install copper tube grids make the installation cost competitive with other heating systems. And he felt strongly that the "sunshine warmth" of radiant heat would be an important feature in attracting and holding tenants.

Each of the 240 apartments has "customized" control of temperature. Each has its own radiant heating system served by a main supply line. A motorized valve, actuated by the apartment's thermostat, controls the flow from supply line to the panel circuits.

Why PG's save time and money. Anaconda Panel Grids are machine-formed radiant heating coils containing 50 feet of Type L Copper Tube, conveniently packaged, ready to install. They lie flat against the ceiling construction so that plaster is applied easily and evenly. They are easily extended by hand to the center-to-center spacing required. Each grid has one tube end expanded for solder connection in series without fittings. PG's are available in two nominal tube sizes, 3/8″ for ceiling installations and 1/2″ for floor panels.

5716

Write for Publication C-6 which gives the full story, including engineering and layout data. Address: The American Brass Co., Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

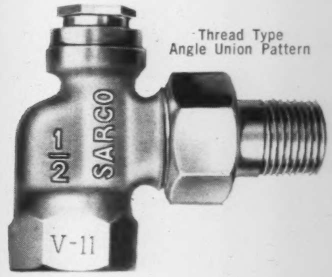
ANACONDA®

PRE-FORMED COPPER TUBE PANEL GRIDS
FOR RADIANT PANEL HEATING
Available through distributors of Anaconda Pipe and Tube

You don't have to treat 'em tenderly

. . . these burly Sarco Balancing Fittings are extra-strong!

FOR USE UP TO 125 PSI
Every single one
TESTED AT 150 PSI!
Can be furnished with
INTEGRAL MANUAL AIR VENTS
All patterns also available in sweat-type.



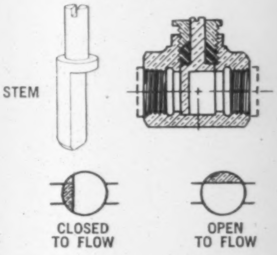
Thread Type Angle Union Pattern

V 31
SARCO
1/2

Thread Type Straightway Union Pattern

V-51
SARCO
1/2

Straightway Screwed Pattern



Solid segment stem which insures linear straight flow

Check other Sarco features that save installation headaches . . . assure top heating performance . . . save you money

Yes, these Sarco fittings are really husky . . . made of heavy brass, of highest commercial quality. They won't crack when you put a wrench on them . . . as lighter fittings often do. Won't cause delays . . . waste high-cost time. Will save you money in the end.

More accurate heat distribution is assured by the solid segment stem of Sarco Balancing Fittings (see cross-section diagram, right). Insures linear straight line flow, not obtainable with the usual butterfly stems.

Integral manual air vents can be furnished with Sarco Balancing Fittings. Their use avoids the headaches and costly time waste when a system has to be drained to release air.

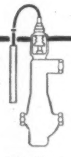
Sarco Balancing Fittings are made in thread and sweat types; all patterns. Also available . . . complete quality lines of access boxes for balancing fittings; valves; air eliminators. Ask for bulletins.

For undivided responsibility on your installations, specify and order from one "Complete Line" source . . . SARCO-SARCOTHERM. Sarcotherm Controls, Inc., 635 Madison Avenue, New York 22, N.Y.

Sarcotherm

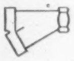
AN AFFILIATE OF SARCO CO., INC.

Products you can rest your reputation on



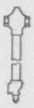
Weather Compensated Control Systems

Radiator Valves • Traps



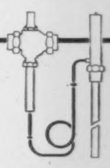
Strainers

Float-Thermostatic Traps



Water Blenders

Air Eliminators

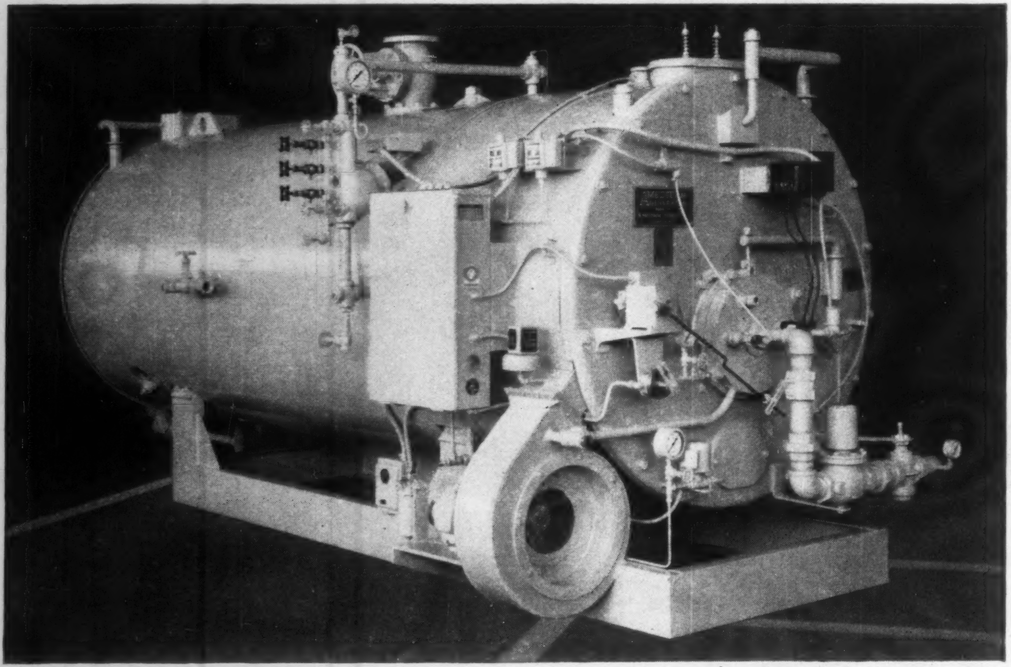


Self-Operated Temp. Reg.

For Temperature Regulators, See Sarco ad, page 25 • For Fin-Tube Radiation, See Sarco ad, page 266

NEW AMESTEAM GENERATOR

MODEL "R"



100 HP Model "R" AMESTEAM GENERATOR

We Kept Our PROVEN DESIGN We Added "ENGINEERED SIMPLICITY"

Retaining all the time-proven principles and benefits so much in demand in AMESTEAM GENERATORS, the new Model "R" brings you many important improvements.

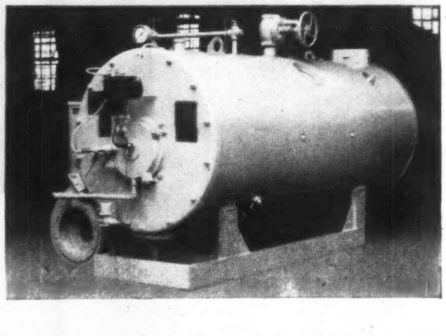
For example, the proven design of the Ames Pressure Vessel is preserved . . . but improved. You'll still find all its reliability, efficiency and simplicity. But, in the Model "R" you'll enjoy these advantages in a much more compact "package" . . . and at a price that will please you.

The Model "R" AMESTEAM GENERATOR is now available in sizes from 10 to 150 HP for pressures up to 250 PSIG, for oil, gas or combination oil-gas firing equipment. Quick fuel switchover is also available. Centrally-positioned auxiliaries and controls simplify your operating procedures.

Like all AMESTEAM GENERATORS, the Model "R" is shipped to you in firing condition, completely inspected and equipped to comply with the local, state or insurance codes specified. All you need to do is connect it up and put it to work.

Investigate the many extra bonus features awaiting you in the new Model "R". Write us today for new Model "R" Bulletin and name of your nearby AMESTEAM representative.

- **SURPRISINGLY COMPACT**
  Saves Floor and Operating Space
- **GUARANTEED 80% EFFICIENCY**
- **CENTRALIZED CONTROLS**
  Save Operating Time
- **NEW FLEXIBILITY OF INSTALLATION**
- **NEW EASE OF MAINTENANCE**
  Conserves Manpower

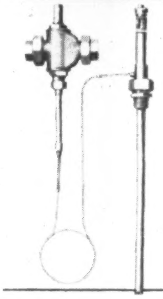


50 HP Model "R" AMESTEAM GENERATOR

AMES IRON WORKS, INC.
BOX D-107 • OSWEGO, N. Y.

Low-cost Temperature Control —by SARCO

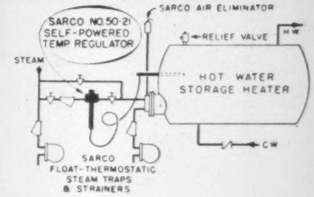
Self-Powered and Electric Indicating



Sarco Temperature Controllers
Self-Powered . . . Fully Modulating

Simple as ABC . . . a thermostat with capillary tubing and a valve. That's all! Operated by liquid expansion. Automatic. Self-powered . . . no electricity or compressed air required. Self-contained . . . no exposed mechanism. Packless valve . . . no stuffing box to leak or stick. Easy to install by any pipefitter.

Furnished with thermostats suitable for any liquid or for air in dryers, ovens, air ducts, etc. Valve sizes . . . ½ to 6″. Temperature ranges to 300°F. *Bulletin 620-2.*

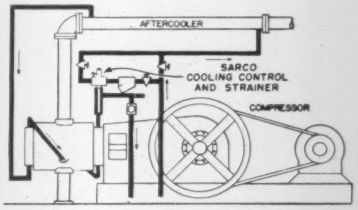

SARCO AIR ELIMINATOR
SARCO NO.50-21 SELF-POWERED TEMP REGULATOR
RELIEF VALVE
H W
STEAM
HOT WATER STORAGE HEATER
C W
SARCO FLOAT-THERMOSTATIC STEAM TRAPS & STRAINERS

Typical applications: **Shell and tube heat exchangers; condensers, oil storage tanks, dryers, etc.**

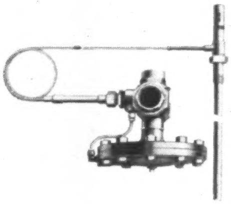
Sarco Cooling Controls
Self-Powered . . . Fully Modulating

Simple, compact, automatic thermostatic valve. Eliminates overcooling and undercooling. Saves water. Overall height of ¾″ size is only 17 7/16″. Self-powered . . . requires no electrical or compressed air hook-up. Valve and bulb all in one unit. No exposed mechanism. Single-seated packless valve . . . not affected by silt or scale-forming minerals.

Valve sizes . . . ⅜ to 1½″. Temperature ranges between 40° and 210°F. *Bulletin No. 710-B.*


AFTERCOOLER
SARCO COOLING CONTROL AND STRAINER
COMPRESSOR

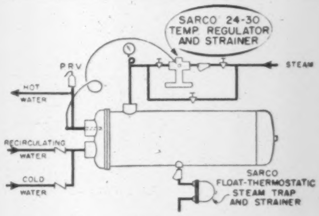
Typical applications: **compressors, small engines, water-cooled bearings, condensers, dry cleaning stills, etc.**



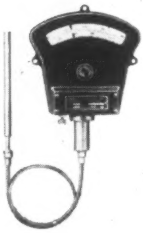
Sarco Temperature Controllers
Self-Powered . . . Single-Seated, Tight-Closing

A simple, self-powered automatic temperature controller with diaphragm-operated, pilot-controlled valve. Designed for intermittent service or service involving long periods with practically no call for steam. Self-powered by liquid expansion . . . no electricity or compressed air needed. Packless.

Valve sizes . . . ½ to 3″. Temperature ranges to 300°F. *Bulletin No. 625-B.*


SARCO 24-30 TEMP REGULATOR AND STRAINER
PRV
STEAM
HOT WATER
RECIRCULATING WATER
COLD WATER
SARCO FLOAT-THERMOSTATIC STEAM TRAP AND STRAINER

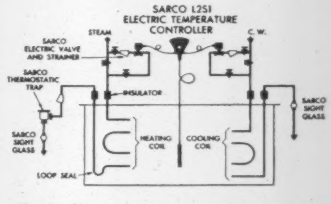
Typical applications: **instantaneous heaters, fuel oil pre-heaters, high pressure applications on hot water storage tanks.**



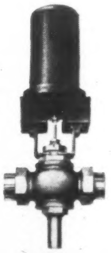
Sarco Electric Temperature Controllers
Indicating Type

Simple, inexpensive, electric-indicating automatic temperature controller. Sensitive enough to perform many of the functions of much more elaborate recorder-controllers, at a fraction of their cost. Responds to changes of ± ½°F. Adjustable. Large, easy-to-read scale shows both actual and set temperatures.

Temperature ranges between minus 90° and plus 650°F. Offers many sequence combinations such as step-heating. *Bulletin 1025-B.*


SARCO L2SI ELECTRIC TEMPERATURE CONTROLLER
STEAM
C. W.
SARCO ELECTRIC VALVE AND STRAINER
SARCO THERMOSTATIC TRAP
INSULATOR
SARCO SIGHT GLASS
HEATING COIL
COOLING COIL
SARCO SIGHT GLASS
LOOP SEAL

Typical applications: **plating tanks, processing vats, kettles, chemical tanks, etc.**



Sarcostat Hydraulic Motor Valves
Electrically Operated

For remote control by hand or thermostat. Open and shut operation. Can be equipped with semi-modulating mechanism. Powerful hydraulic action operates valves up to 5″ single-seated, or 8″ double-seated, at pressures up to 175 psi. Ruggedly constructed . . . to withstand severe use without constant supervision and with minimum maintenance. Operates in any position.

For direct connection to 110 volts A. C., 60 cycle current. Valve sizes . . . ½ to 5″ single-seated; ½ to 6″ double-seated. *Bulletin 1080-A.*

UNDIVIDED RESPONSIBILITY

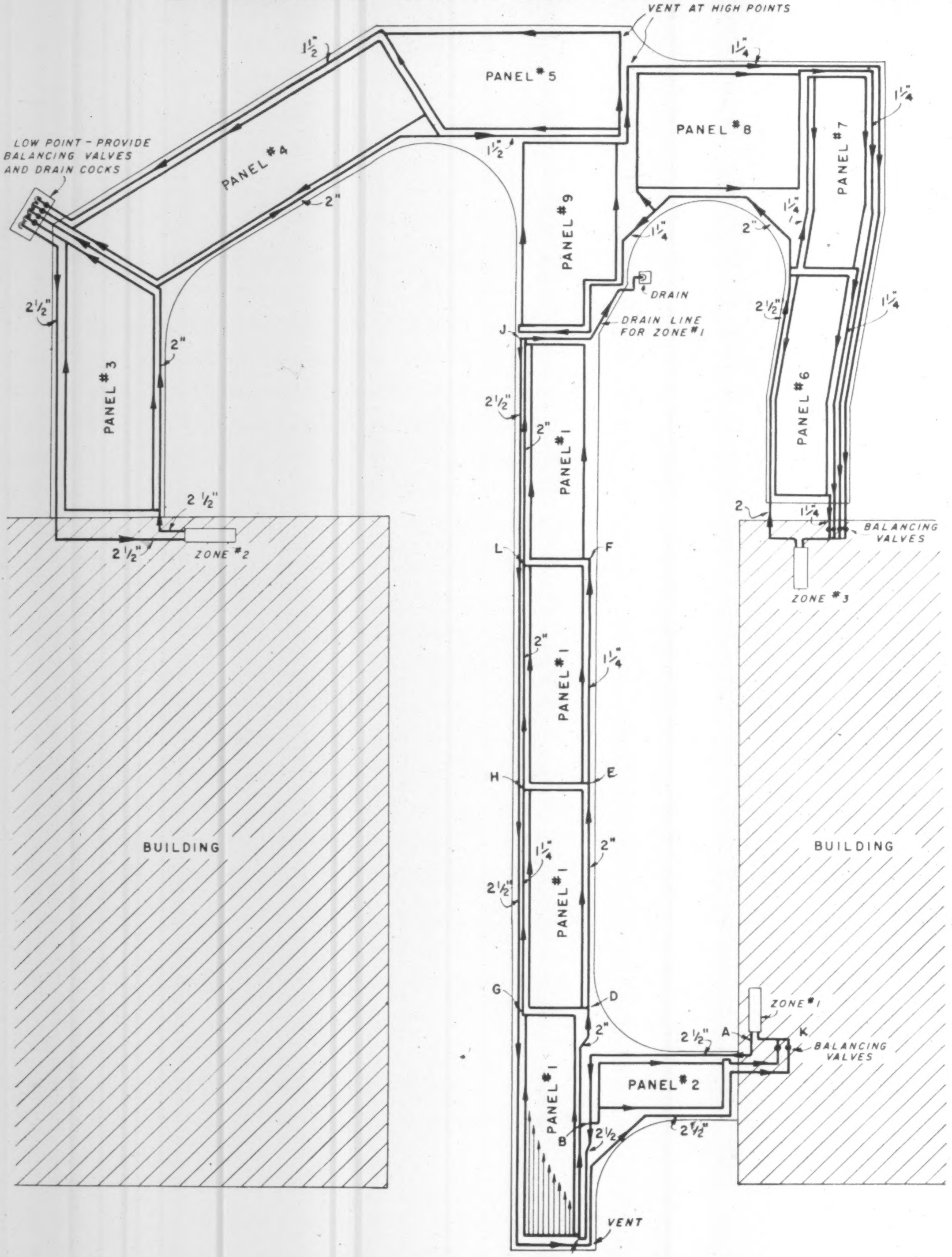
From one "Complete Line" source . . . SARCO-SARCOTHERM . . . for temperature controllers, steam traps and other heating specialties.

2230-B

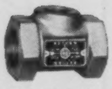
***Write for Bulletins to*—Sarco Co., Inc., Empire State Bldg., New York 1, N.Y.**

For Balancing Fittings, See Sarcotherm ad, page 23 • For Fin Tube Radiation, See Sarco ad, page 266

STUDIES IN FORCED HOT WATER


VENT AT HIGH POINTS
1½"
PANEL #5
1¼"
PANEL #8
PANEL #7
1¼"
LOW POINT - PROVIDE BALANCING VALVES AND DRAIN COCKS
PANEL #4
1½"
2"
PANEL #9
1¼"
2"
1¼"
2½"
1¼"
DRAIN
DRAIN LINE FOR ZONE #1
2½"
2"
PANEL #3
J
PANEL #6
2½"
2"
PANEL #1
2 ½"
2
1¼"
BALANCING VALVES
2½"
ZONE #2
L
F
ZONE #3
2"
1¼"
PANEL #1
H
E
BUILDING
BUILDING
1¼"
2"
2½"
PANEL #1
G
D
ZONE #1
2"
2½"
A
K
BALANCING VALVES
PANEL #2
PANEL #1
B
2½
2½"
VENT

A COMPLETE LINE OF EQUIPMENT FOR HEATING AND COOLING WITH WATER

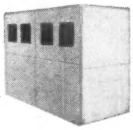

Monoflo Fittings

Relief and Reducing Valves

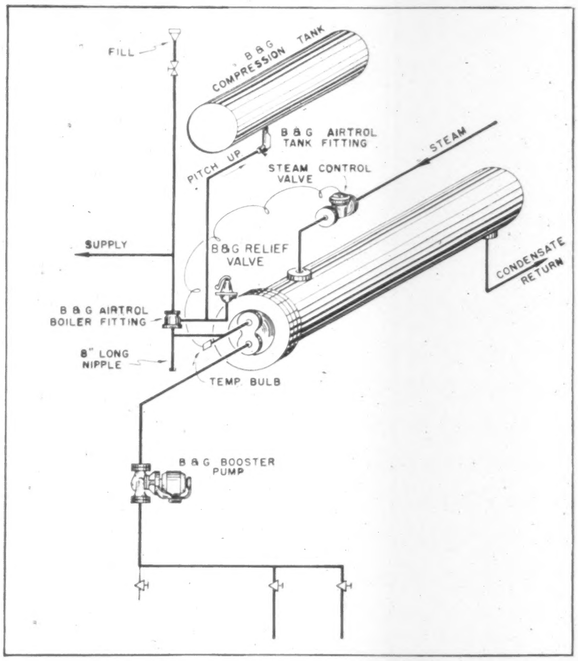
Water Heaters

Flo-Control Valves

Compression Tanks


Package Liquid Coolers

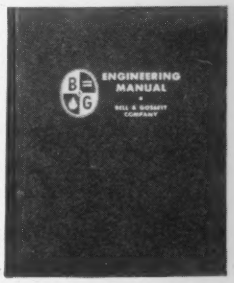
HEATING SYSTEM DESIGN



Snow melting installation for industrial building

The design of this snow melting installation is presented in complete detail in the B&G Engineering Manual.

A snow melting system primarily differs from a panel space heating system in the heat load calculation. The heat load of the snow melting panels in most cases is determined by the pick-up load, or the heat required to raise the temperature of the cold slab to a temperature which will melt snow.



Since a snow melting system heat load is directly related to the depth of bury of the pipe coils, this important point is covered thoroughly in the Manual. In concrete examples, it is demonstrated how depth of bury can be varied to provide a design solution which is sound in engineering, construction and cost.

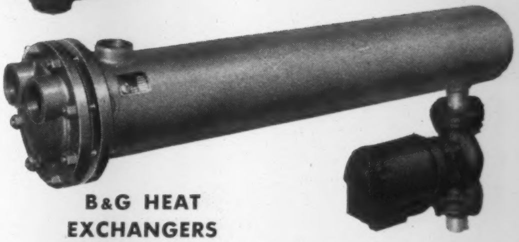
See your local B&G Representative for a copy of the B&G Engineering Manual.

B&G QUIET PUMPS FOR CIRCULATED WATER SYSTEMS

Whether for snow melting or heating and cooling systems, B&G Booster and Universal Pumps have an outstanding record for dependable performance. They are distinguished particularly for *quiet, vibrationless* operation. The features which contribute to this all-essential characteristic include specially designed and tested motors—oversized shafts—spring-type flexible couplers and long sleeve bearings.

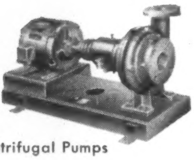
B&G Circulating Pumps are oil lubricated, with water positively sealed from the bearings by a Mechanical Seal developed by B&G. These pumps can be easily serviced without breaking pipe connections—removal of a few bolts permits separation into three parts.

A complete range of sizes is available, with capacities to 1650 GPM, heads to 86 ft.



B&G HEAT EXCHANGERS

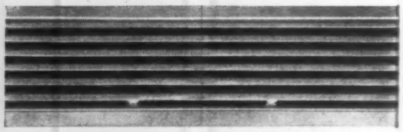
Available as steam-to-water or water-to-water units. The exchanger illustrated is the "WU", equipped with B&G Booster for pumping boiler water through the shell. Pumped circulation greatly increases the capacity of the heater and permits close control of water temperature. Send for catalogs GC-1054 and GN-1054.



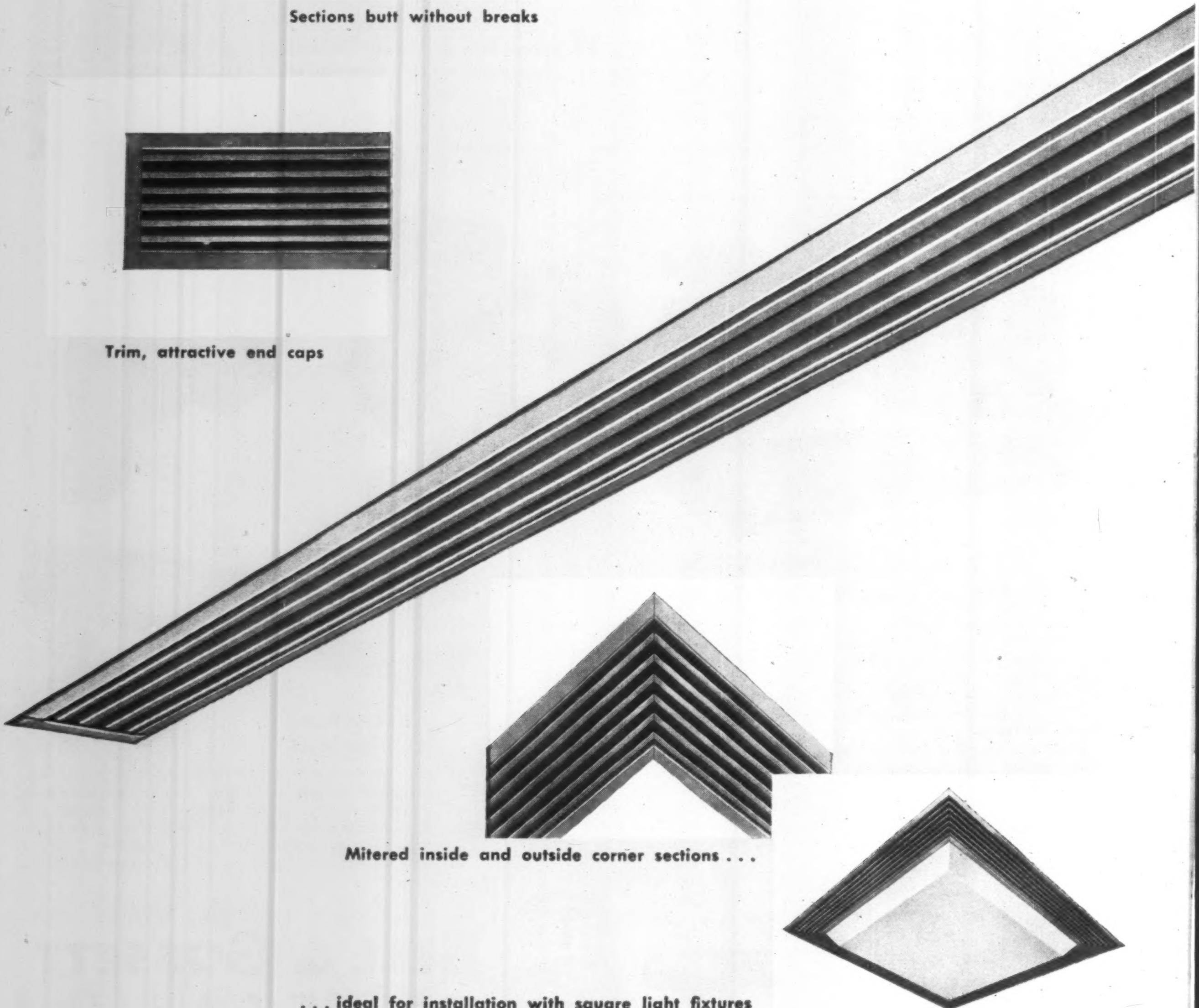
Centrifugal Pumps

Evaporators and Condensers

BELL & GOSSETT
COMPANY
Dept. EZ-5, Morton Grove, Illinois
Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto 16, Ontario



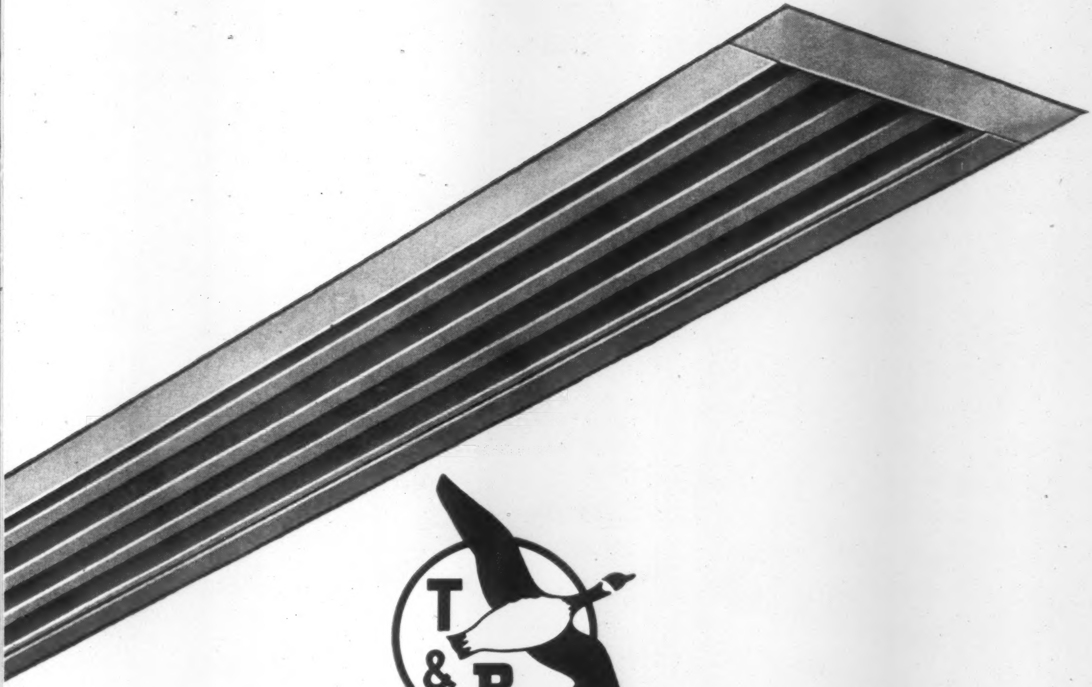
Sections butt without breaks



Trim, attractive end caps

Mitered inside and outside corner sections . . .

. . . ideal for installation with square light fixtures



LINEAR DIFFUSERS

preserve the clean-line symmetry of modern architectural design

For installation on ceiling or sidewall, Tuttle & Bailey Linear Diffusers are designed to maintain the functional straightline beauty of modern architectural concepts. Particularly effective when installed in continuous runs, individual sections butt neatly without breaks, and mitered 90° inside and outside corners permit extension of the clean-line symmetry on perimeter applications. A unique yet simplified method of installation eliminates the need for screws in the margin of the diffuser. Units can also be furnished with a recessed plaster frame which means only the unbroken lines of the louvres are visible.

Tuttle & Bailey Linear Diffusers may be installed on either the supply or return portions of the system. They are available as one-way or two-way blow units in 18", 24", 30", 36", 48", 60" and 72" lengths.

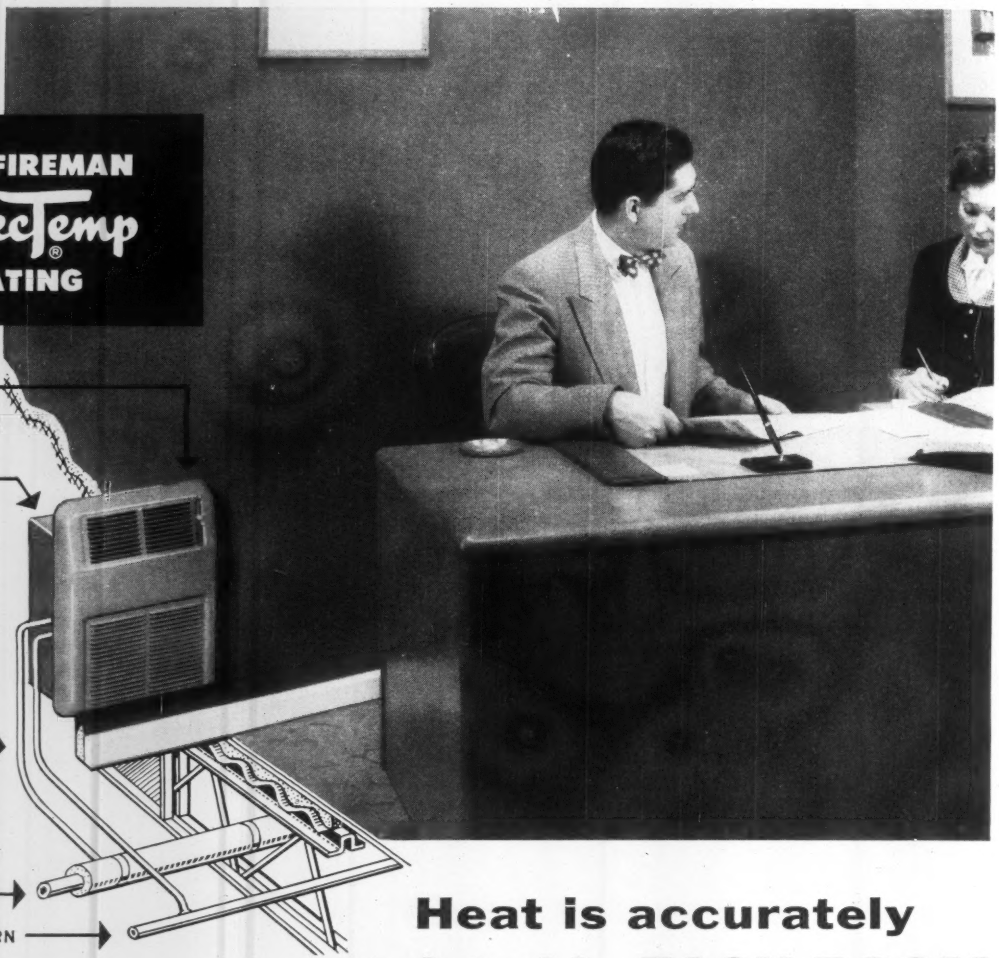
TUTTLE & BAILEY

division of Allied Thermal Corp. New Britain, Connecticut

LINEAR
DIFFUSERS

Today . . . write for Catalog No. 114.

IRON FIREMAN
SelecTemp®
HEATING



Each individual room heater is a fully automatic unit containing a steam heating core, air filter, forced air blower with steam turbine drive, and non-electric thermostat, all packaged into a compact steel housing with an attractive grille face. Unit is recessed into the wall, with only the grille extending beyond the wall surface.

Low initial cost. Easily installed in either new or old construction. Small copper tubing carries steam to individual room heater units. Substantial savings in installation costs.

Heat is accurately regulated in EACH ROOM

Each office, hospital, church, hotel, motel, or school room is a separate heating zone. Each unit continuously regulates heat needed for each room. No special adjustments of dampers, valves or orifices required to balance heating system. Automatically compensates for external heat sources such as fireplace or solar heat, without affecting temperatures of other rooms.

Heating of each room is controlled by occupant Individual comfort is assured because the occupant can set thermostat at any level desired.

Present steam systems converted easily to SelecTemp. Frequently, existing boiler and steam mains can be used. Cumbersome radiators are replaced with compact SelecTemp wall heating units. Ideal for use with boilers fired by gas, oil, coal, or with district steam.

Heat saved when rooms are unoccupied. Temperatures can be lowered in unoccupied rooms, which can be quickly reheated when needed. Motel and hotel owners, for example, say Iron Fireman heating the finest ever devised. It cuts fuel costs and pleases guests.

A thermostat in every room. Every type of building or home can now have individual room temperature control, at a cost comparable to that of many steam or hot water systems which do not make each room a separate heating zone.

Architects and heating engineers readily recognize that Selectemp heating solves many stubborn heating problems. Now you can actually heat a building to please everyone. Room occupants enjoy a new standard of comfort, regardless of the building's exposure to cold winds, heat from the sun—or the number of people in the room.

A heating engineer (who expressed skepticism at first), wrote as follows, after a winter's experience with SelecTemp in his own office:

"We have experienced sub-zero temperature with high winds. Our office has been held at an ideal temperature, with almost no variation up or down. We now consider this SelecTemp system the most marvelous and satisfactory heating installation we have ever seen, and expect to specify it in many of our own jobs."

Continuous, *modulated* heat. Air circulation is continuous. Both temperature and volume of air are automatically modulated, as required, to offset heat loss from each room.

For full information write Iron Fireman Mfg. Co., 3369 W. 106th St., Cleveland 11, Ohio. (In Canada, please address Iron Fireman Mfg. Co. of Canada, Ltd., 80 Ward Street, Toronto, Ontario).

IRON FIREMAN®
Engineered HEATING AND COOLING

When it is up to you... install

O-B VALVES

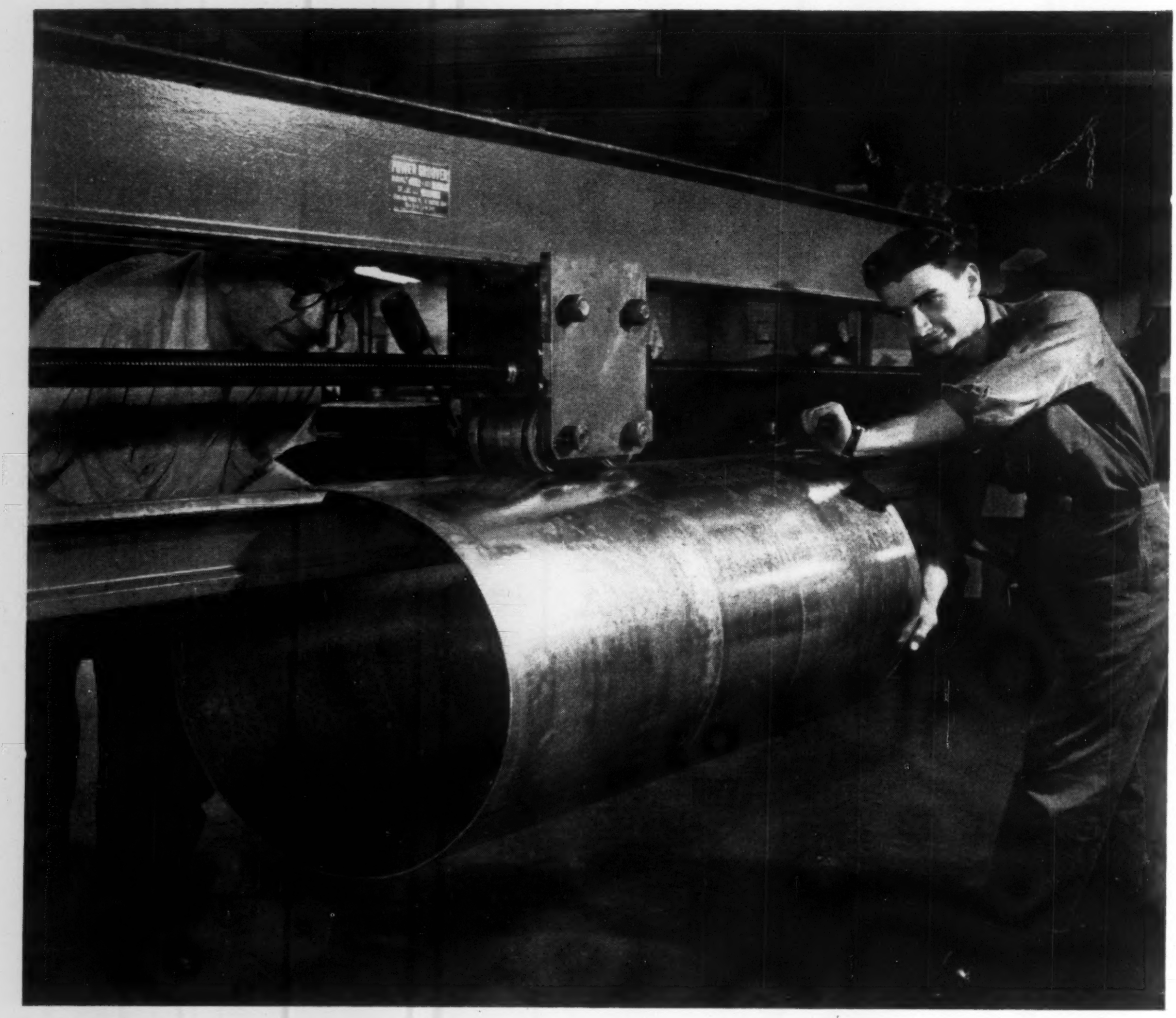
their many features will give customers added faith in your judgment...

For instance, think what it means to a customer when he doesn't have to shut down a line to replace worn valve packing. With standard O-B bronze gate and globe valves — 125 lbs. WSP and above — the stem is designed so that it seals pressure within the body when the valve is full open. Repacking is quick, safe.

Ask your Ohio Brass distributor about the complete line of O-B valves.

OHIO BRASS COMPANY • MANSFIELD, O.

4728-V



Bethcon is strong yet easy to work

It's true: Bethcon galvanized sheets offer a remarkable combination of strength and ductility not to be found in other galvanized sheets. And that, of course, results in smooth shopwork and satisfied customers.

Bethcon sheets owe their superior qualities to Bethlehem's last-word continuous galvanizing lines. These lines include a continuous annealing process which gives the base steel its strong-yet-workable characteristics.

In addition, Bethlehem's continuous galvanizing process applies the zinc coating much more tightly to the steel than the conventional hot-dip method. Thus you can put a Bethcon sheet through the toughest forming processes without danger of cracking or flaking the coating. Even when Bethcon is doubled back on itself, the coating remains intact.

Bethcon sheet is available in 13-ga and lighter, coiled or in cut lengths, with either plain open-hearth or copper-bearing steel (Beth-Cu-Loy) for the base metal. If you desire additional information on Bethcon, you will get prompt attention from the nearest Bethlehem sales office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

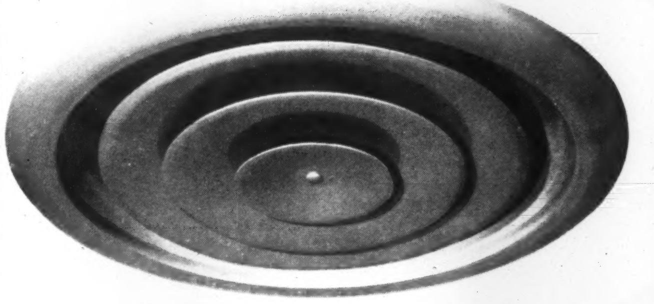
BETHLEHEM STEEL

BETHLEHEM STEEL

Announcing the

NEW FLEXIFLO

TYPE QP



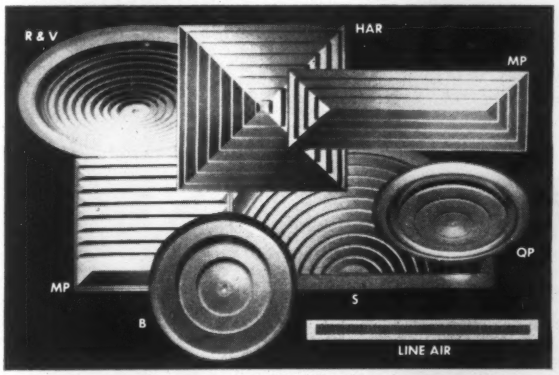
4-CONE
Adjustable Pattern
DIFFUSER

We present the "QP" diffuser for the ultimate in styling and elegance. It's built of the finest materials, and quality-finished for unexcelled appearance and performance.... AND it's priced right!

The "QP" diffuser is made up of 4 spun cones. By rotating the lower blade, the core will move up or down with the consequent change of air delivery pattern from horizontal through any angle to vertically down. The "QP" diffuser can be used equally well for cooling, ventilating and heating. It may be installed either in exposed duct work or flush to the ceiling.

Volume control is obtainable by using any of our three standard FLEXIFLO dampers to meet specific requirements. Get the FACTS on this most advanced design in 4 cone diffusers. Mail the coupon today.

FLEXIFLO — The most extensive line of DIFFUSERS in the industry



R—Cooling, adjustable
V—Heating & Cooling, adjustable
B—Heating & Cooling, fixed
QP—4-cone, adjustable
HAR—Square, adjustable
MP—Rectangular and square
S—Half-round
LINE AIR—Long slot diffuser
PLUS—many other types

☐ Send data on the "QP" diffuser.
☐ Send your general FLEXIFLO Diffuser Engineering Manual on round, square, rectangular and slot diffusers.

Name .... Title ....
Company ....
Address ....
City .... Zone ...... State ......

UNIVERSAL DIFFUSER CORP.
38 Marbledale Road, Tuckahoe, N. Y.
Canadian Representative:
Douglas Engineering Co., Ltd., Montreal and Toronto

How owners feel about an all-copper installation

Excitedly pleased—that's the way owners of property feel about an all-copper installation you do for them in Hussey Copper. You, too, are reassured that your copper installation will create a satisfied customer and a lasting reputation for quality workmanship. Hussey Copper gives you controlled quality from the raw ore to the finished copper product you use. It's good business-insurance to use Copper—but make sure it's Hussey Copper.

C. G. HUSSEY & COMPANY
(Division of Copper Range Co.)
Rolling Mills and General Offices
PITTSBURGH 19, PA.

HUSSEY
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PHILADELPHIA (30) 1632 Fairmount Ave.
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Since 1848
HUSSEY
COPPER · BRASS

COUNTERFLOW SERIES 4

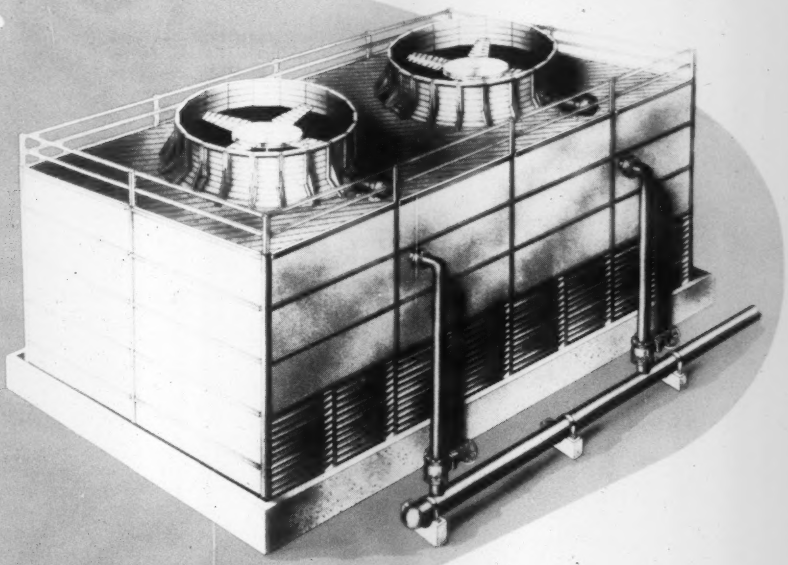
Fluor

The Fluor Series 4 Counterflow Induced Draft Cooling Tower is designed for large industrial central air conditioning systems.

Available in a multiplicity of cell sizes to meet any cooling requirement. In the Series 4, efficient design and low profile are combined to offer unsurpassed performance with no orientation limitations. Standard design meets all local and regional building codes.

Fluor Air Conditioning and Refrigeration Cooling Towers are available through exclusive representative companies in all major market areas. Experienced service and erection personnel are strategically located to render close customer contact when and where needed.

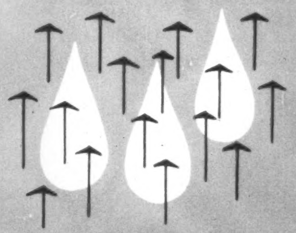
fp



AIR MOVING EQUIPMENT

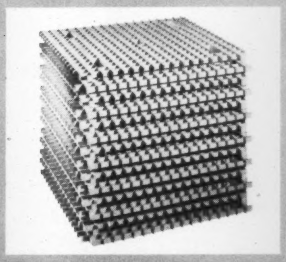
To assure continuous low cost operation, the Series 4 design incorporates the same rugged, heavy duty air moving equipment already proven in thousands of Fluor Industrial Cooling Towers now in operation throughout the world. Fluor-Solar stainless steel fans . . . Fluor-Western spiral bevel gears rated for infinite life . . . heavy duty galvanized steel motor and gear support . . . non-lubricating type flexible coupling with floating shafts . . . standard NEMA Type TEFC horizontal drivers . . . a combination that means dependable 24 hour a day performance, at the lowest possible maintenance cost.

COUNTERFLOW



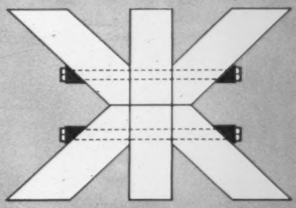
The high performance characteristics inherent in the Series 4 are a result of the counterflow principle of air and water moving concurrently to one another, proven to be the most efficient method of cooling.

POLY-GRID



Fluor patented "Poly-Grid" high impact polystyrene fill provides more cooling per cubic foot than any other fill available...reduces total fill weight by 75% when compared to conventional wood fill.

CONSTRUCTION



Entire tower structure, including through-bolted compression type joints, is designed to withstand 30 pounds per square foot wind loading, in accordance with U. S. Forest Products Handbook.

fluor

COUNTERFLOW COOLING TOWERS

SERIES 4

GENERAL SPECIFICATIONS

Structural members . . . milled from select heart California Redwood . . . non-structural members, excluding "Poly-Grid" fill are milled from heart grade redwood. Redwood columns are 4" x 4", spaced on 6' centers.

Sheathing . . . single wall 3/8" thick cement asbestos, redwood sheathing optional.

Filling . . . Fluor patented "Poly-Grid", high impact polystyrene . . . redwood fill optional.

Access . . . ladder or stairway, to customer specifications.

Distribution system . . . low pressure type . . . header and laterals of redwood pipe banded with stainless steel.

Nozzles . . . non-clogging spray nozzles of high impact phenolic resin.

Fan Stack . . . redwood fan stack of circular venturi gusset type.

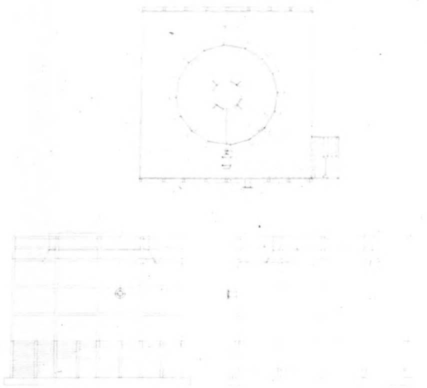
Vibration cut-out switch . . . Fluor patented standard component furnished for complete protection of mechanical equipment and personnel.

Louvers . . . slip-fit cement asbestos.

Fan Deck . . . designed to withstand 60 lb./sq. ft. minimum live load.

Hardware . . . galvanized steel. Non-Ferrous hardware optional.

Basin . . . redwood, furnished as specified.



Data requirement for bid

1. Type of service
2. Water circulation rate or tons of refrigeration
3. Inlet water temperature
4. Outlet water temperature
5. Wet bulb temperature
6. Type and quantity of water contamination, if any
7. Wind loading (Normal design 30 lbs./sq. ft.)
8. Power source and characteristics
9. Type of fan drive desired
10. Location and size of adjacent structures
11. Type of collecting basin, redwood, steel or concrete

Physical dimensions

Tower height (above curb) to fan deck 17'-0"

Fan stack height 4'-0"

Riser height (above curb) 12'-2"

Static pumping head (above curb) 15'-8" (including nozzle loss, but not riser pipe friction)

Tower sizes: 12' x 12' to 24' x 24' Single Fan Cells.

Multiplicity of cell combinations available to customer requirements.

fp

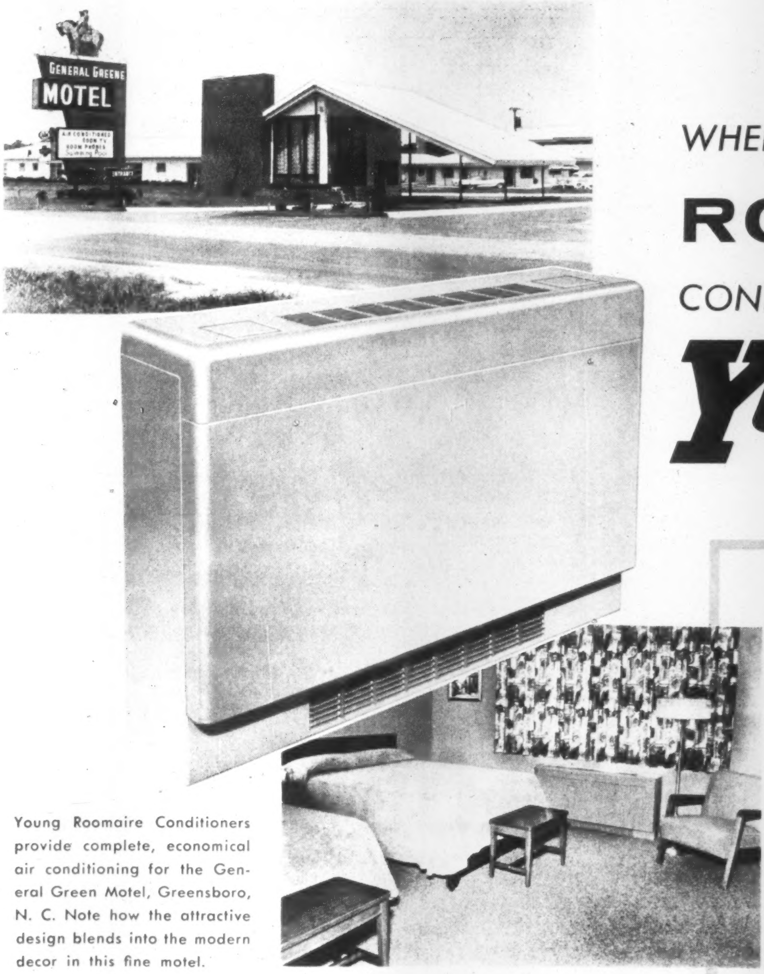
AIR CONDITIONING & REFRIGERATION COOLING TOWER DIVISION

FLUOR PRODUCTS COMPANY
A DIVISION OF THE FLUOR CORPORATION, LTD.
GENERAL OFFICES • WHITTIER, CALIFORNIA

Representatives In All Major Market Areas . . .

BULLETIN NO. ACR-ID-O.450

PRINTED IN U.S.A.



Young Roomaire Conditioners provide complete, economical air conditioning for the General Green Motel, Greensboro, N. C. Note how the attractive design blends into the modern decor in this fine motel.

WHEN YOU SPECIFY

ROOMAIRE®

CONDITIONERS BY

Young

you can choose from

4 MODELS in 4 SIZES

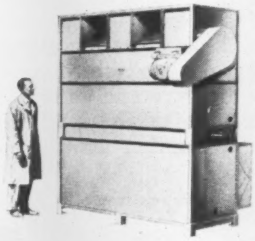
each with individual unit control

Young Roomaire conditioners provide year 'round air conditioning of individual rooms in multi-room installations—motels, hotels, homes, schools, hospitals, offices, etc. Each unit, subject to individual control, circulates, filters, dehumidifies, heats or cools the air to the desired temperature.

Chilled water is circulated through the unit coil for cooling; hot water for heating. In operation all recirculated air, or a mixture of recirculated and fresh air, is drawn through filters by quiet blower fans, blown over the heat transfer coil surface and discharged into the conditioner space. Only three pipes serve each unit—water, water return and drain.

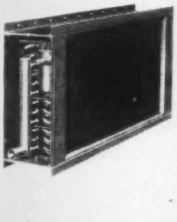
For sizes, styles and complete information about Roomaire Conditioners see your nearest Young representative, or write to Young Radiator Company, Dept. 517-K, Racine, Wisconsin.

YOUNG SECTIONAL DESIGN AIR CONDITIONING UNITS



For year 'round service for cooling, heating, filtering, circulating, humidifying and dehumidifying in any combination. Nine sizes: capacities from 400 to 22,000 cfm. Horizontal and vertical types.

YOUNG HEATING AND COOLING COILS



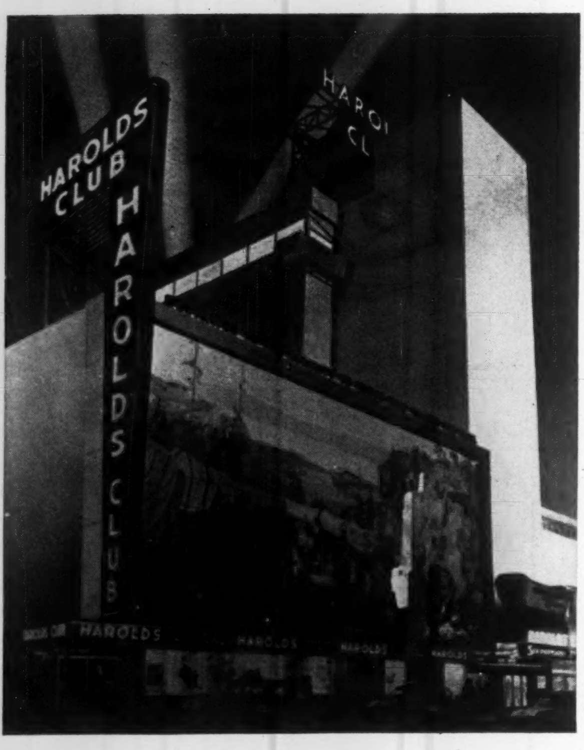
Young manufactures a complete line of heating and cooling coils for central heating or cooling systems.

Young RADIATOR COMPANY

RACINE, WISCONSIN

Creative HEAT TRANSFER ENGINEERS

Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Mattoon, Illinois



Ordinary Thermostats Couldn't Handle This Job!

Comfostats Take It In Stride and Highlight

One of the Most Flexible

Air Conditioning Systems on Record!

It's the Story of

HAROLD'S CLUB—RENO

On a given weekend, up to 19,000 people may heed the call of Lady Luck and flock to Reno's fabulous Harold's Club*. The doors are open 24 hours a day, seven days a week. It not only is the biggest, but it's the most comfortable casino in the country.

UNUSUAL CONTROL PROBLEMS

Reno's design temperature of 95 F and a huge volume of customers are common enough air conditioning control problems.

But, unlike other types of buildings where the cooling load is either concentrated in one or a few areas or fairly evenly distributed throughout, cooling loads at Harold's Club are concentrated around crowded gaming tables and shift constantly and rapidly from table to table and game to game. The sensible to latent ratio of the load varies widely from one location to another *within* rooms as well as among rooms.

MULTIPLICITY OF SMALL ZONES

Response to the constantly shifting loads is provided by a high velocity, double-duct system equipped with a mixing unit for each gaming table or area. Mixing units are installed above the ceiling and discharge through aspirating-type ceiling diffusers.

The key to the successful operation of this highly flexible system is its regulation by means of a Johnson Pneumatic Control System. For high accuracy control, Johnson *Comfostats* are pendant-mounted beneath the diffusers and directly above each table, which is the point of greatest load concentration and maximum aspirating effect. This assures instant response to load changes, with accurate proportions of cool and warm air available for each table.

COMPENSATE FOR HUMIDITY LEVELS

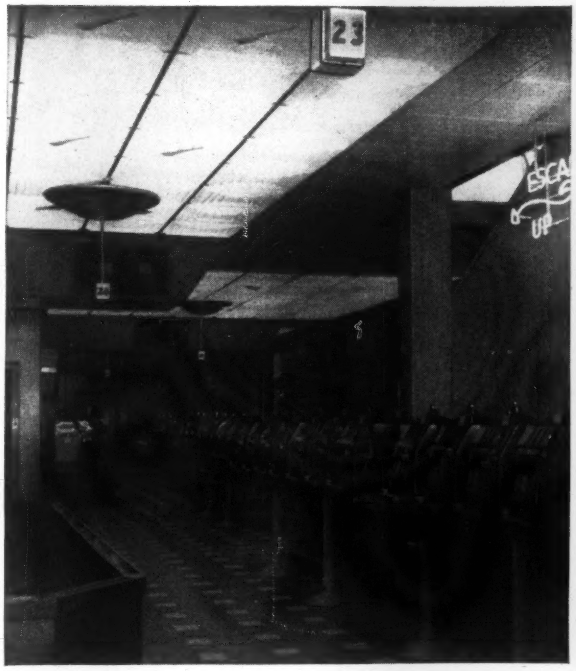
With *Comfostats*, customers of Harold's Club enjoy an exceptional degree of comfort. These humidity-compensated thermostats, which are made exclusively by Johnson, reduce the dry bulb temperature by an appropriate amount as the humidity increases, thus compensating for the high latent component of the load that exists wherever a crowd gathers. Each of the 110 diffusers is individually controlled by its own *Comfostat*, so that the system is actually zoned for each gaming area or table. System flexibility and response of the pneumatic controls provide cooling where and as needed, with a minimum of installed refrigeration capacity.

*Harold's Club, Reno, Nevada, Ferris & Erskine, architects, Reno; Clyde E. Bentley, mechanical engineer, San Francisco; Earl O. Stice Co., mechanical contractor, Glendale, California.

JOHNSON CONTROL

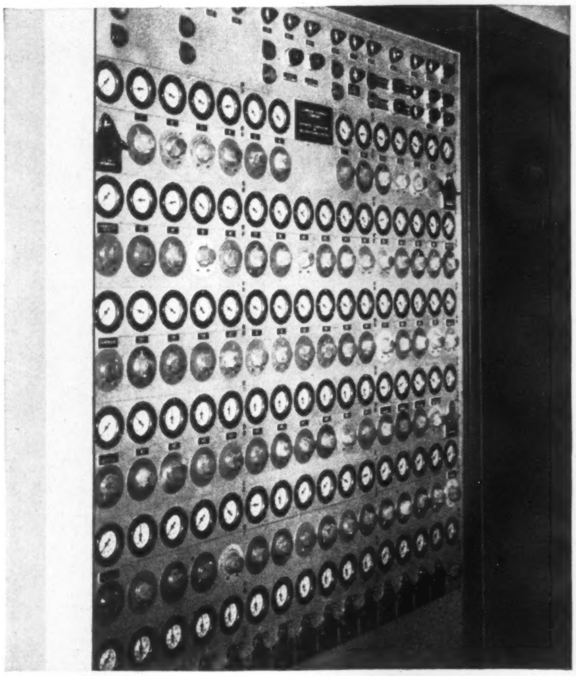
PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885



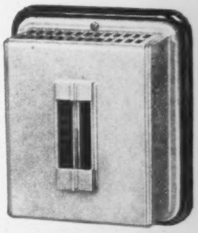
110 Zones of Comfort. What appear to be section number markers over each gaming area are actually pendant-mounted Johnson *Comfostats.* There are four individually controlled comfort zones in the view above. Harold's Club offers a choice of 750 slot machines, plus roulette, black-jack, craps, and cards.

Mixing Unit Control. Each air outlet is zoned and has its own *Comfostat* and a remote temperature indicating bulb suspended from the center of the diffuser. The temperature in each zone can be conveniently checked from a remote indicator in the engineer's office.



Control Center. Operation of the system is simplified by this control center which permits the engineer to reset *Comfostats* without leaving his office. Also, with remote reset, unoccupied areas can be held at higher temperatures to reduce cooling costs.

Control from "Effective" Temperatures with Johnson *Comfostats*



T-411 *Comfostat*

Johnson *Comfostats* control from "effective" temperatures, regulating temperature in proportion to humidity changes. Available in room, *Dual* room, insertion and submaster models. *Comfostats* are made only by Johnson. Mail the coupon for full details.

No matter how exacting your needs, a Johnson Pneumatic Control System can meet your requirements. Next time you have a control problem, turn it over to the specialist Johnson organization, the leader in pneumatic control. A nearby Johnson engineer will gladly give you his recommendations without obligation.

JOHNSON SERVICE COMPANY

507-B East Michigan Street, Milwaukee 1, Wisconsin

Please send me your free literature describing Johnson *Comfostats.*

Name & Title ____________________

Firm ____________________

Address ____________________

City & State ____________________

SMOKE TEST shows one of the many heating patterns possible with TRANE Projection Unit Heaters. More freedom of location — patented Louver Cone Diffuser steers heat in any direction. Heat patterns are easily changed for future needs without moving unit.

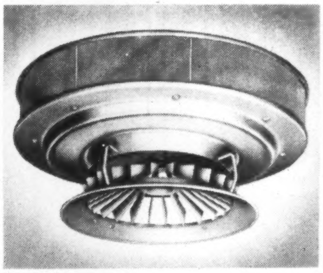
How to put the heat where you want it

Exclusive Trane diffusion features give you freedom of design . . . freedom of location

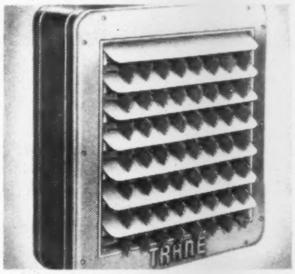
You can solve factory and commercial heating problems more easily with these TRANE Unit Heaters. That's because the exclusive TRANE diffusion features allow you to locate equipment where you please—and direct the heat where it's needed. Heat patterns are easy to change to meet future needs, too. A simple adjustment of the heat flow can save costly relocation of equipment.

And the TRANE heating lines are so *complete*, you can specify equipment that is *just right* for the job—whether it's spot heating, space heating or a complete central system. TRANE brings you *matched* equipment—designed, engineered and built together, to *work* together.

Next time you're planning heating for any commercial or industrial application, make it TRANE! Call your nearby TRANE Sales Office, or write TRANE, La Crosse, Wisconsin.



PROJECTION HEATERS are vertical discharge units that project heat from ceiling to the floor line. 18 standard and high cfm models for steam or hot water. Exclusive TRANE Louver Cone Diffuser directs air stream in any desired pattern—gives one unit the versatility of many.



HORIZONTAL HEATERS feature famous TRANE Coils and a specially designed broad blade unit heater fan. Used for horizontal discharge, space and spot heating. Patented Louver Fin Diffusers direct air stream in an unlimited number of diffusion patterns. Gas-fired models available.

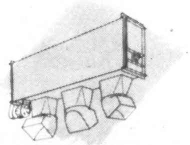
For any air condition, turn to

TRANE

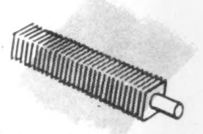
MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA. • TRANE COMPANY OF CANADA, LTD., TORONTO • 90 U.S. AND 19 CANADIAN OFFICES

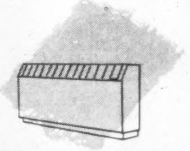
Turn to Trane for every heating need . . .



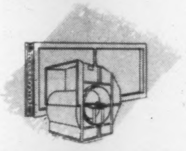
HEAT AND VENTILATE large areas with a TRANE Torrivent. Rugged, efficient centrifugal unit that handles up to 33,000 cfm.



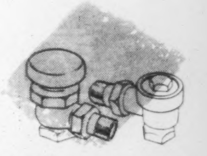
UNDER WINDOWS and skylights, TRANE Wall-Fin gives low-cost draft protection. May be tiered for extra capacity.



TRIM, NEW WALL-FIN in cabinets for cafeterias, office, administration areas gives you custom styling with production models!



FOR "BUILT-UP" SYSTEMS, TRANE Fans and Coils are "matched"—built together to work together. Wide range of capacities.



SAVE FUEL with the new, redesigned line of TRANE Steam Specialties. Traps, strainers, valves, vents for any type of system.

INSTALL IT...FORGET IT!

Flexon®

PACKLESS EXPANSION COMPENSATOR

the no-maintenance way to take up expansion in heating lines

EXPANSION
COMPENSATOR
PRESSURE SYSTEMS
MAXIMUM
STROKE
1/2"
MAXIMUM
PRESSURE
40 pounds
FLEXONICS CORPORATION, Maywood, Ill.

Specify it and install it now . . . forget it for the life of the building! There's no easier way to tell you the really important facts about the Flexon Expansion Compensator.

And there's no easier way to take care of pipe and tubing expansion, either. Flexon Expansion Compensators take little more space than the pipe or tubing that they replace. A mechanic can install one in minutes. Thousands of installations have proved them.

Standardize on this simple specification: Flexon Expansion Compensators for horizontal and vertical lines – Model L for low pressures – Model H for higher pressures. Write today for design and cost data.

The inside story

2-PLY

CONSTRUCTION

The bellows is fabricated from two plies of specially-rolled metal to combine strength with flexibility. Bronze bellows for Model L; stainless steel for Model H.

Flexonics

corporation

EXPANSION JOINT DIVISION • 1391 S. THIRD AVENUE, MAYWOOD, ILLINOIS

EXPANSION JOINTS
METAL HOSE
NON-METALLIC HOSE
BELLOWS
AIRCRAFT COMPONENTS

INSTALL IT . . .

FORGET IT!

Flexon® *PACKLESS* EXPANSION COMPENSATOR

Install it . . . and walk away from it once and for all! Flexon Model H Expansion Compensator is the modern way to take up expansion and motion in pipes up to 3″, because it's *packless.* No maintenance required—ever. It's there to stay, for the life of the building.

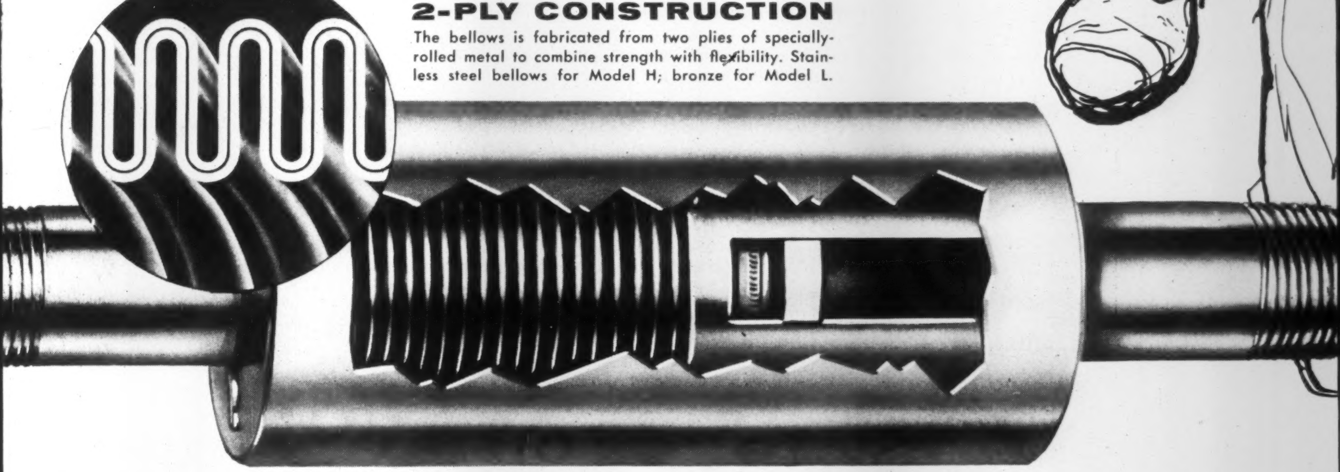
You get delivery when you need it, because Flexon Model H Expansion Compensators are available from stock. *And here's a bonus!* They cost much less per inch of stroke than any other method of absorbing pipe expansion. Up to 1¾″ total movement in all sizes. Working pressures up to 150 p.s.i. for ¾″ and 1″ sizes; up to 100 p.s.i. for larger sizes.

Write for facts about Flexon Expansion Compensators, design and cost data, and the name of your Flexon distributor.

The inside story

2-PLY CONSTRUCTION

The bellows is fabricated from two plies of specially-rolled metal to combine strength with flexibility. Stainless steel bellows for Model H; bronze for Model L.



EC-110

Flexonics
corporation

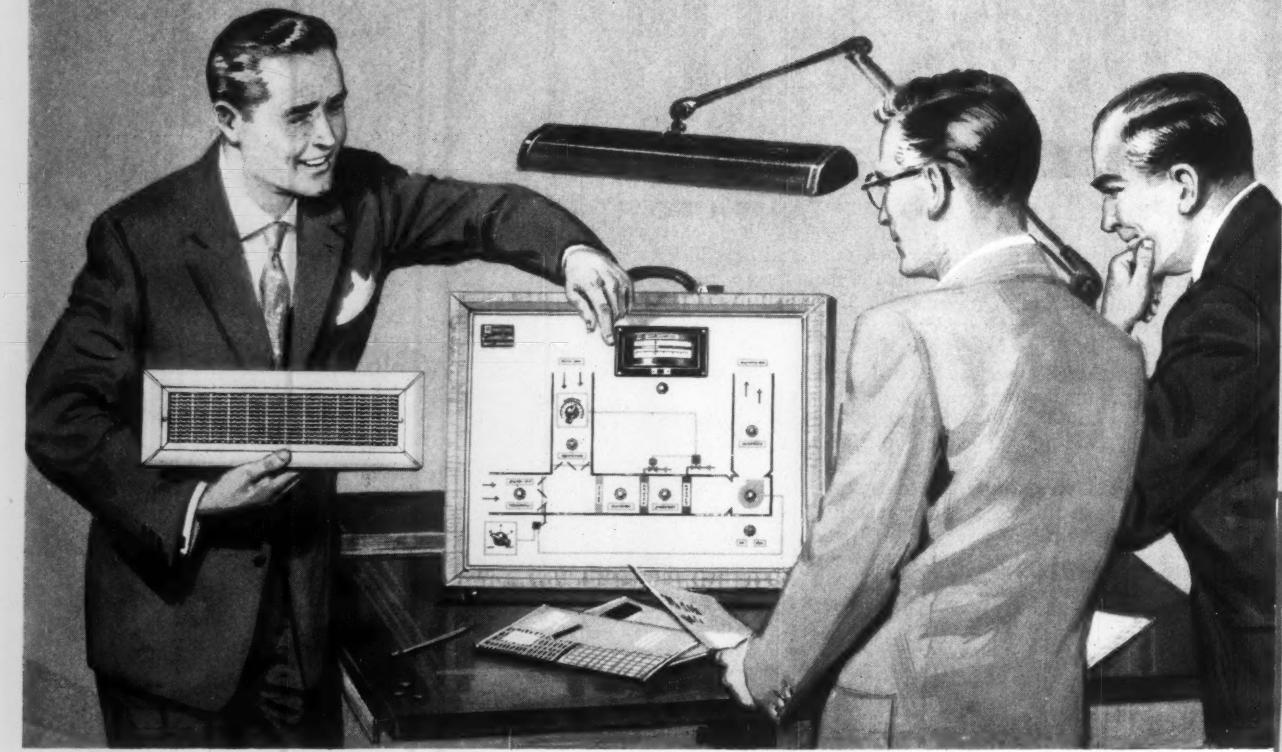
EXPANSION JOINT DIVISION • 1391 S. THIRD AVENUE, MAYWOOD, ILLINOIS

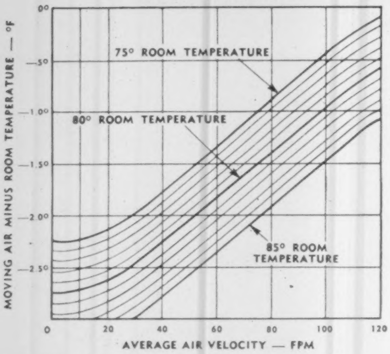
EXPANSION JOINTS · METAL HOSE · NON-METALLIC HOSE · BELLOWS · AIRCRAFT COMPONENTS

THE MARK OF QUALITY

BARBER
COLMAN

one source
one responsibility. . . . . . .




COMFORT CHART

COMFORT STANDARDS

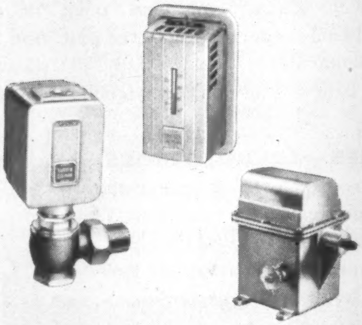
Barber-Colman engineers have developed a Comfort Chart illustrating the proper relationship between air velocities and air temperatures necessary for human comfort. This chart, shown at the left, serves as a criterion for rating the performance of Barber-Colman automatic control and air distribution products. It indicates conditions of air movement and temperature in the occupancy zone. The line shown for each average room temperature is the limit of satisfactory comfort conditions. All points below the line represent uncomfortable conditions while those above the line fulfill Human Comfort Standards. As the *one source* for *both* temperature control and air distribution products, the Barber-Colman man can assure the proper relationship of temperatures and velocities as dictated by this chart.

COMBINED PRODUCTS, COMBINED SKILLS . . . COME TO ONE SOURCE . . . . .

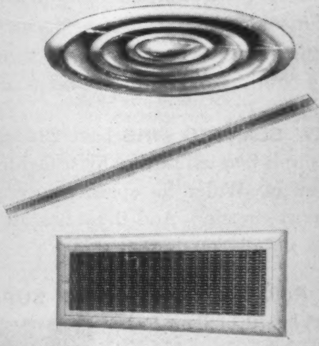
. . . for your Automatic Controls and Air Distribution Products

Yes, Barber-Colman is prepared to give you a combination of *both* temperature control and air distribution, selected and adjusted for ideal comfort! A complete line of superior-quality equipment, coupled with a nationwide field organization experienced in the selection and application of Automatic Control and Air Distribution equipment, is quickly and easily available. The Barber-Colman Sales Engineer assumes the responsibility for selection and placement of equipment and is available for supervision of installation and final balancing of the combination system. More and more of these system combinations are being furnished by Barber-Colman as the solution to problems resulting from an ever-changing architectural concept and the demand for higher comfort standards. Phone your nearby Barber-Colman field office for a discussion of how you can benefit from this highly logical trend.

This new fully illustrated bulletin details advantages of the complete temperature control and air distribution system combinations available through the one source and one responsibility of Barber-Colman. Write for your copy of Bulletin F8326.



Barber-Colman Electrionic Automatic Controls and Uni-Flo Engineered Air Distribution Products are the result of extensive research, laboratory tests, and field experience. Accurate, comprehensive engineering data are available for each of these products. You may use them confidently.



BARBER-COLMAN COMPANY

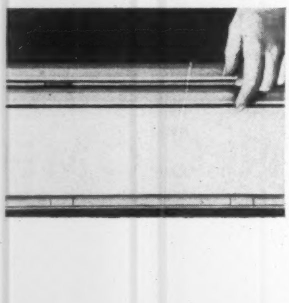
Dept. V, 1601 Rock Street, Rockford, Illinois

P.S.I.* the best Baseboard

*** PER SQUARE INCH** —*feature for feature—Slant-Fin out-engineers, out-performs all other competitive heating units—costs you less to install. It's the first choice of contractors, builders and architects. Here's why:*

THE NEW SLANTED FINS have 29% extra heating surface. Heat output is boosted further by sealed fin ends which create a stack effect. Wider fin spacing increases air circulation, reduces dust clogging. And these fins are safe. No more cut fingers for installation crews.

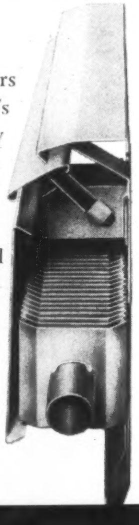
UNIQUE PIVOT-ACTION DAMPER SUPPLIED FREE with every length of Slant-Fin. No bulky knobs or chains. Vane opens or closes with finger-tip pressure at any point. It pivots on a stainless steel rivet, operates smoothly, will never bind, can be set at intermediate positions.



FIRST REALLY SILENT BASEBOARD. The fin-touch-fin construction soaks up sound. "Ping" and "pong" noises—a major cause of call-backs—are a thing of the past. And Slant-Fin has licked friction noises, too. All fins slide silently on an ingenious track hanger. Fins don't even touch the enclosure.

STRONGER TUBES — LONGER SERVICE. When joining tube to fin, other manufacturers expand, thin-out and weaken the tube. Slant-Fin's exclusive process maintains full wall thickness by forcing the tube through undersized fin holes. The tube is never weakened by expansion.

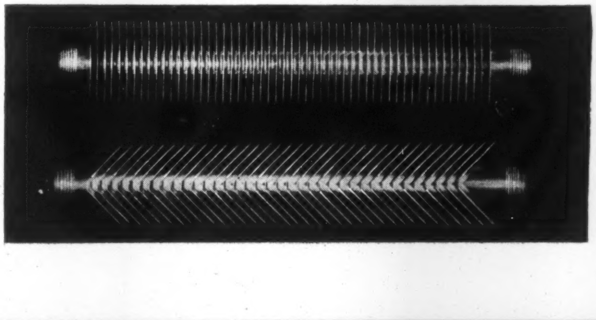
FINS CAN'T LOOSEN. Fins are firmly bonded together and to the tube by rigid tooth-and-bubble flanges. This perfect bond assures better heat transfer. *And talk about strength!* You can stand on this finned element. Fins cannot be crushed or bent—they reinforce each other.



Heating anyone can buy!

NO CUTTING OR ASSEMBLING ON THE JOB. Cutting to fit can be annoying and costly. Use 4, 5, 6 or 8 foot Slant-Fin lengths with telescoping extensions for a faster installation. Each unit is individually packaged, completely assembled at the factory. End caps, wall trim and inside corners are all equipped with time-saving piano hinges. Front panels and all accessories just snap on. No screws. No tools. Not one minute of wasted installation time with Slant-Fin baseboard heating.

FROM COMMERCIAL RADIATION TO FINNED PIPE FOR SPECIAL PROCESS INSTALLATIONS, YOU CAN ALWAYS RECOGNIZE A SLANT-FIN PRODUCT BY ITS ENGINEERING AND DESIGN EXCELLENCE.



Send for FREE helpful booklet:

"A NEW SLANT ON CUTTING BASEBOARD INSTALLATION COSTS"

Here's an important checklist of installation economies and short cuts to help you speed up baseboard jobs. This booklet talks your language, gives you the *facts* and lets you decide this question for yourself: Which baseboard manufacturer is doing the most to cut your installation costs and boost your profits? Send for this booklet. It's an eye opener. And it's free. Just complete and mail the coupon below today.

Please see that I receive your free booklet, "A New Slant on Cutting Baseboard Installation Costs".

I AM A ☐ CONTRACTOR ☐ BUILDER ☐ ARCHITECT
☐ HEATING ENGINEER ☐ WHOLESALER ☐ OTHER

NAME____________________

FIRM____________________

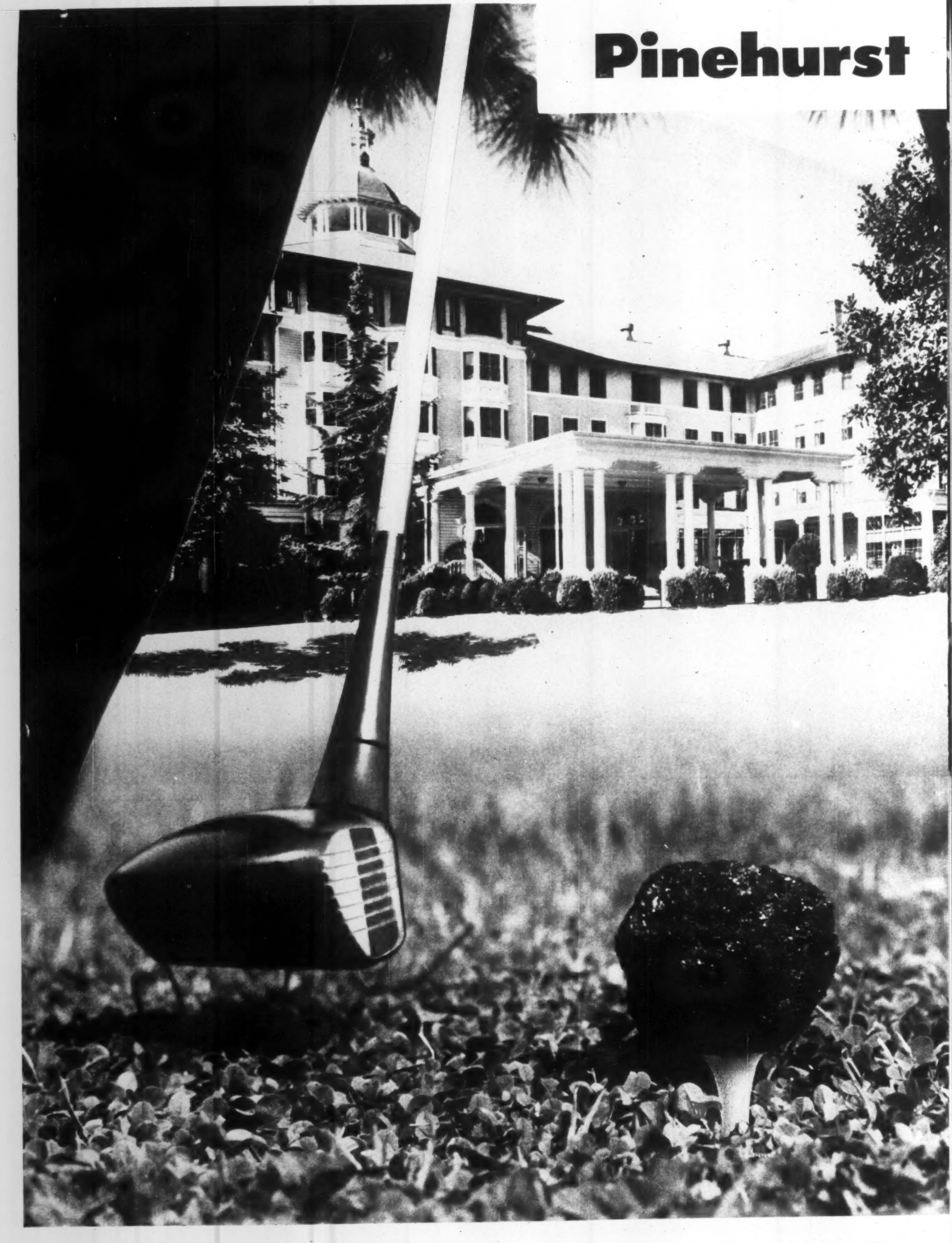
ADDRESS____________________

CITY________________STATE________

Slant/Fin
RADIATOR / CORP. SF

87-49 130th Street, Richmond Hill 18, N.Y. (Dept. HP-107)

Pinehurst



tees off on fuel costs

Golfing resort cuts costs 33% with modern burning of coal

The central power plant at the famous golfing resort of Pinehurst, N. C., has to furnish a reliable supply of steam to three hotels and seven other buildings.

When Pinehurst recently decided to modernize power facilities, the consulting firm of Wiley and Wilson, Richmond, Va., was called in to study the situation. Since coal cost approximately 40% less than the nearest competitive fuel, the final decision called for burning coal the modern way. Today two new automatic stoker-fired boilers (only one of which is operated at a time) replace four 150-HP hand-fired boilers. Combustion control is automatic; coal and ash handling is greatly simplified. And now, according to management, "the cost of generating steam is 33.4% less than with the old plant."

Facts you should know about coal

Not only is bituminous coal the lowest-cost fuel in most industrial areas, but up-to-date coal burning equipment can give you 10% to 40% more steam per dollar. Today's automatic equipment can pare labor costs and eliminate smoke problems. And vast coal reserves plus mechanized production methods mean a constantly plentiful supply of coal at a stable price.

Technical advisory service

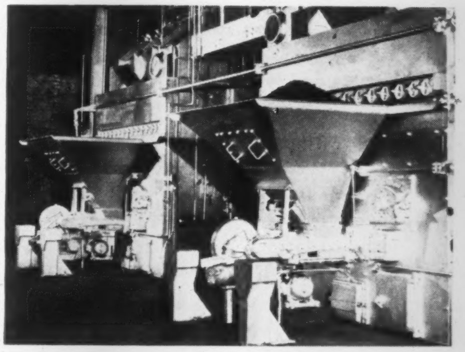
The Bituminous Coal Institute offers a free technical advisory service on industrial fuel problems. If you are concerned with steam costs, write to the address below. Or send for our case history booklet, complete with data sheets. You'll find it informative.

Consult an engineering firm

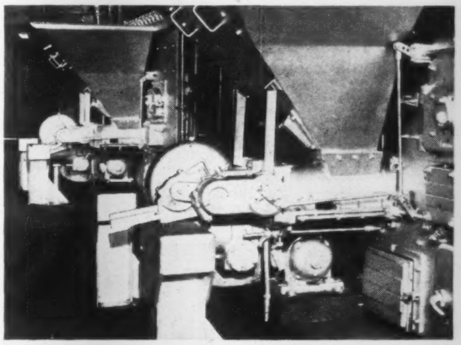
If you are remodeling or building new heating or power facilities, it will pay you to consult a qualified engineering firm. Such concerns—familiar with the latest in fuel costs and equipment—can effect great savings for you in efficiency and fuel economy over the years.

BITUMINOUS COAL INSTITUTE

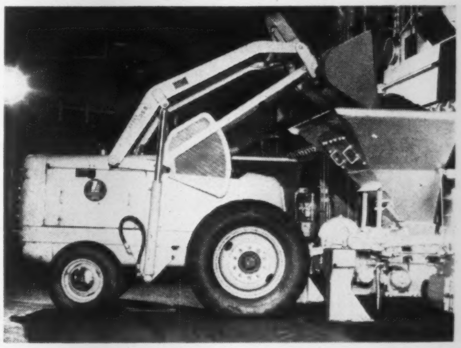
Southern Building • Washington 5, D.C.



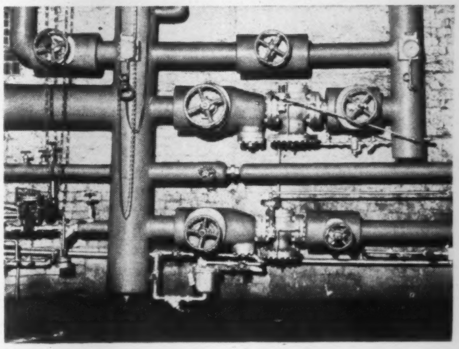
Two Babcock & Wilcox type FF integral-furnace boilers supply all the steam for Pinehurst at about 125 pounds pressure at 600° F. Average steam load is 11,000-12,000 pounds per hour per day.



Close-up of stokers. These underfeed, single retort, side-dump models are made by Detroit Stoker. They operate automatically, each driven by a 3 HP enclosed motor.



Frank G. Hough Payloader transfers coal from railroad trestle to storage, from storage to stokers. Payloader also facilitates handling of ash disposal.



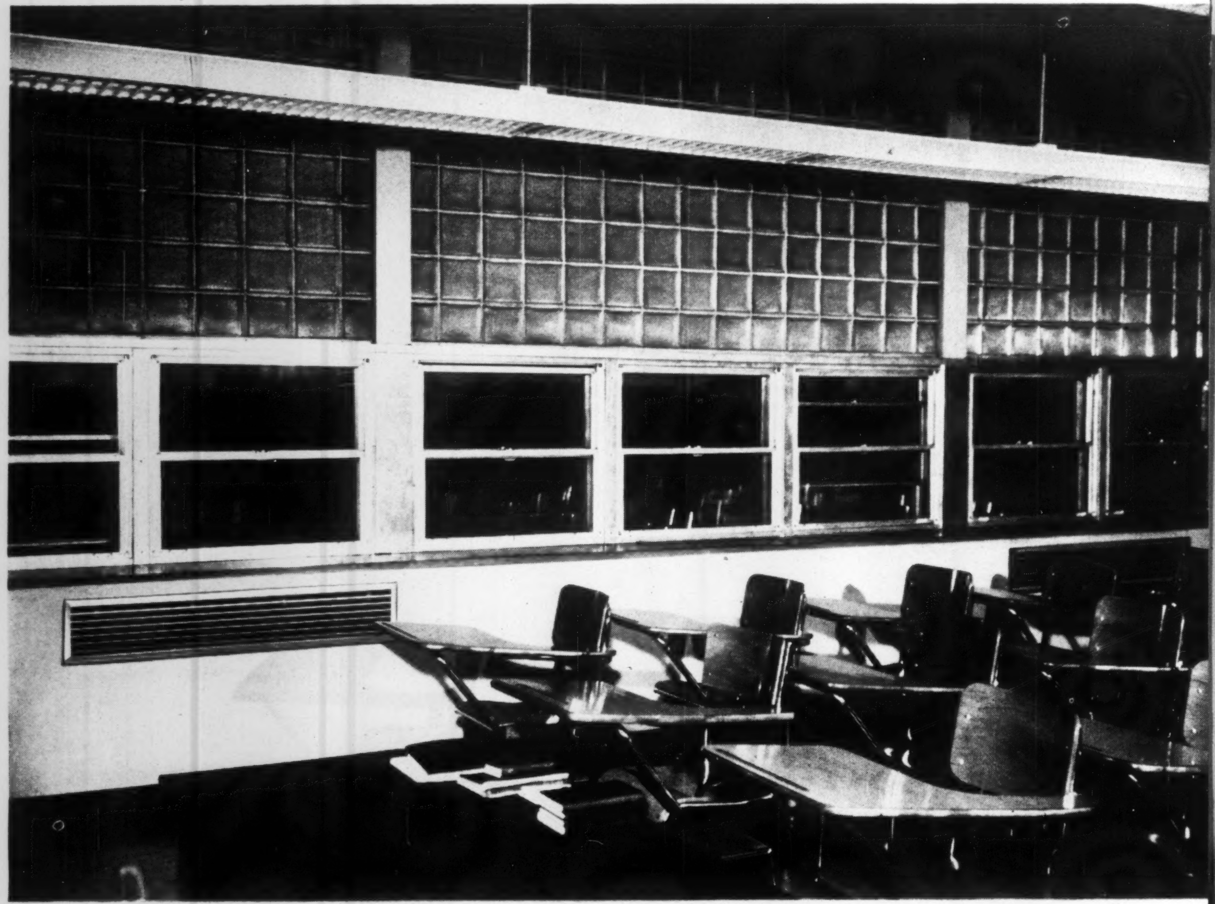
Readily accessible, all of the steam distribution lines are taken off a manifold in the engine room. Five separate lines with Ruggles-Klingemann automatic pressure regulators distribute the steam at the required pressure in each case.

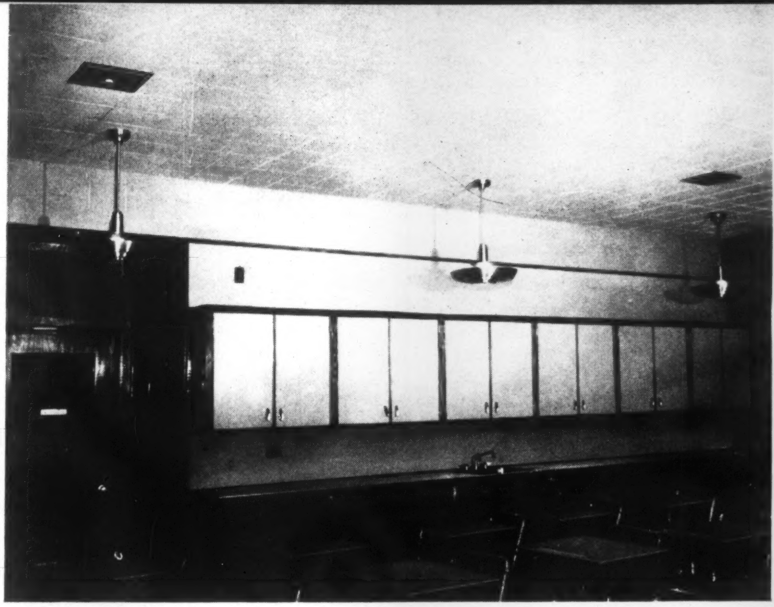
How high velocity provides maximum comfort for schools

The *Anemostat All-Air High Velocity* system of draftless air distribution offers many important advantages for heating and ventilating schools. ● High velocity units, used with smaller than conventional ducts, save space and money. They substantially reduce sheet metal required, can be installed faster, at less cost. Since there are no coils in All-Air HV units, clogging and odors are eliminated. ● Anemostat *All-Air HV* operate entirely with air processed in the main equipment room; there is, therefore, no need to break through the walls of the building for prime air make-up. The Anemostat *All-Air HV* units eliminate fans, filters, and electric motors in the school rooms. Units are quiet, need a minimum of maintenance from custodians. ● On these pages are typical installations in which the *Anemostat All-Air High Velocity* system has been used successfully. Application data on your specific school heating, ventilating or air conditioning problem is available from Anemostat representatives or from the home office.

Architects—attention please:

Anemostat round, square and straight line diffusers with high velocity units are adaptable to a wide variety of architectural designs.





←

In this schoolroom Anemostat Type E Square Air Diffusers are installed in the ceiling.

Here Anemostat SLW Straightline Air Diffusers on the high sidewall provide draftless comfort.

↓

Note the Anemostat UTW Straightline Air Diffuser located under the window in this classroom.

←

Anemostat UTW Straightline Air Diffusers are placed under the windows in this school laboratory.

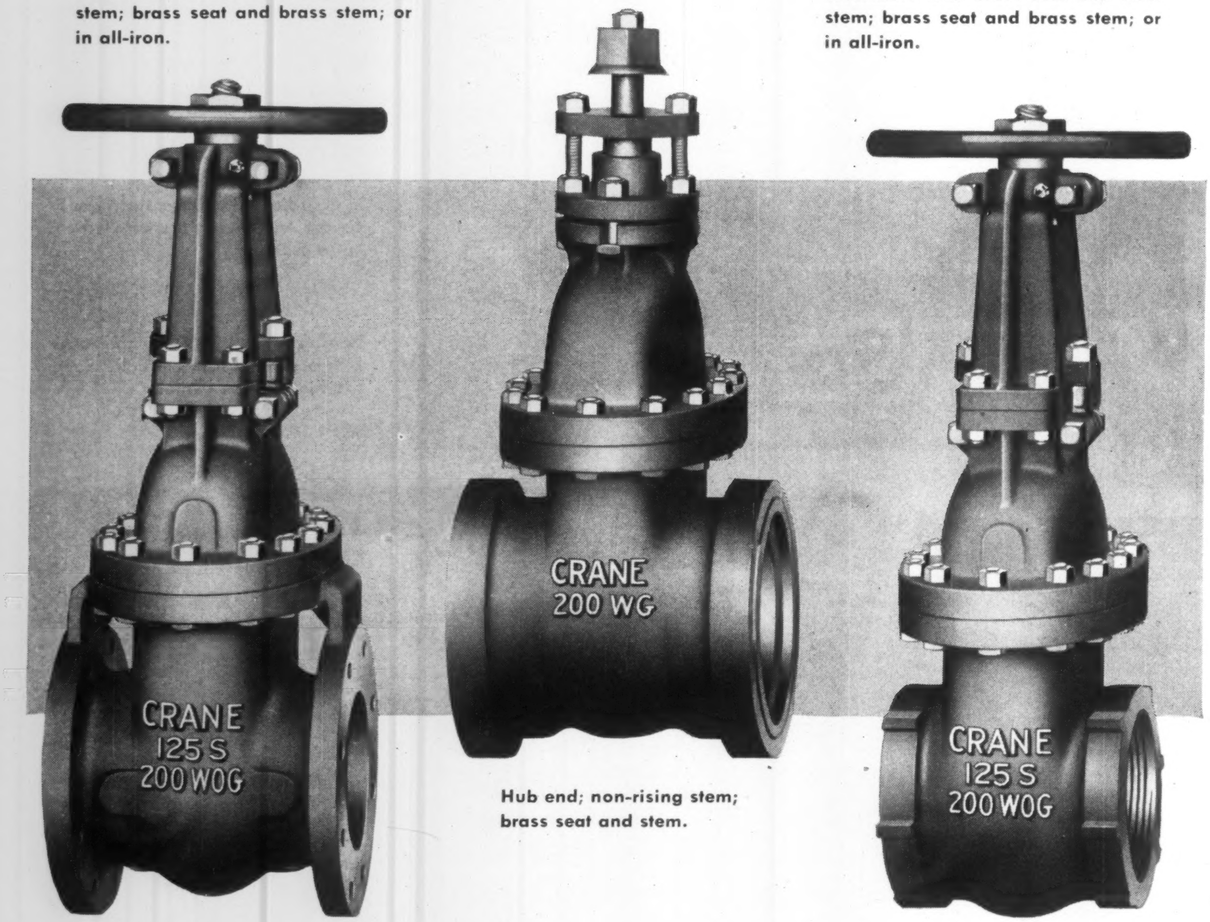
↓

Write on your business letterhead for your copy of

New Anemostat Selection Manual 60

to Anemostat Corporation of America,
10 East 39th Street, New York 16, N. Y.

ANEMOSTAT: The Pioneer of All-Air High Velocity Systems



Flanged end; outside screw and yoke. Available with brass seat and steel stem; brass seat and brass stem; or in all-iron.

Hub end; non-rising stem; brass seat and stem.

Screwed end; outside screw and yoke. Available with brass seat and steel stem; brass seat and brass stem; or in all-iron.

Crane Iron Body Gates–Versatile Valves

for Many Services in Nearly All Industries

Look to Crane for better performing 125-pound iron body wedge gate valves. Improved design gives them greater strength and important operational advantages. As a result, these valves offer dependable performance on a wide variety of services . . . easy maintenance . . . long life.

Among the advantages of Crane iron body wedge gates are:

- *Oval body and bonnet,* with extra metal where needed most.
- *No bonnet joint leakage*—More bonnet bolts on closer centers insure uniform bolt load distribution on bonnet joint and gasket.
- *Long disc guides* seat discs properly . . . minimize drag on seating surfaces . . . prolong valve life.
- *Shoulder-type seat rings* prevent rings from loosening in service.
- *Two-piece ball-type gland* prevents binding on stem even when gland bolt nuts are pulled up unevenly.
- *Exceptionally deep stuffing box* can easily be repacked under pressure when valves are wide open.
- *Available in 19 sizes*—2 inches to 48 inches—all-iron or brass trimmed. In addition, Crane makes companion valves in globe, angle, check, quick-opening and Underwriters' patterns.

For complete descriptions of Crane iron body gate valves, consult your Crane Representative, or write to Crane Co. at the address shown below.

CRANE **VALVES & FITTINGS**

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

CRANE

How to boost your batting average on big boiler bids

Successful bidding on big boiler jobs depends on more than just competitive pricing. Often, the good reputation of the boiler you select can be the "extra" that wins the job for you. Or, some outstanding feature of your boiler may be the deciding factor in your favor.

That's why putting a Crane boiler in your bid can help so much in getting it accepted. Crane boilers have *top reputations*. And Crane boilers have lots of *outstanding features*.

For instance, Crane's Sunnyday 40 and Sunnyday 60 offer you hot water or steam boilers that have been specially designed for gas. As a result, they give you a number of important advantages. Base of boiler is all steel for positive leveling and easy, labor-saving assembly. Patented "Staggered Heat Travel" is an exclusive Crane feature that increases the efficiency. Gross IBR outputs of the two boilers run from 280,000 to 4,000,000 Btu per hour.

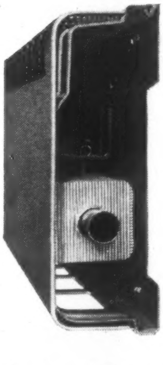
Crane 30 and 41 boilers on the other hand are for all fuels and also for either steam or hot water. The Crane 30 has an opening for a built-in tankless water heater. And the Crane 41 has special connections for a heater provided on the back section. Gross IBR outputs range from 268,000 to 2,197,000 Btu per hour for the two boilers.

Why not boost your chances of getting your next bid accepted by including a Crane boiler. Get information on Crane's complete line of boilers (residential or commercial) by calling your Crane Branch or Crane Wholesaler now.

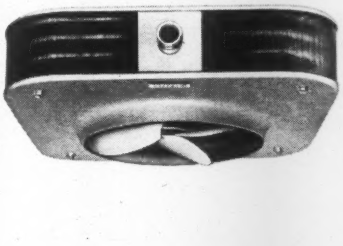
CRANE CO. 836 S. Michigan Avenue, Chicago 5
VALVES . FITTINGS . PIPE . PLUMBING . KITCHENS . HEATING . AIR CONDITIONING

Here's the famous Sunnyday 60. *This big, hot water or steam boiler together with the Sunnyday 30, 40, and Crane 41 assures you of a boiler that's a perfect fit for any heating problem.*

COMPLETE HEATING SYSTEMS FROM CRANE, TOO



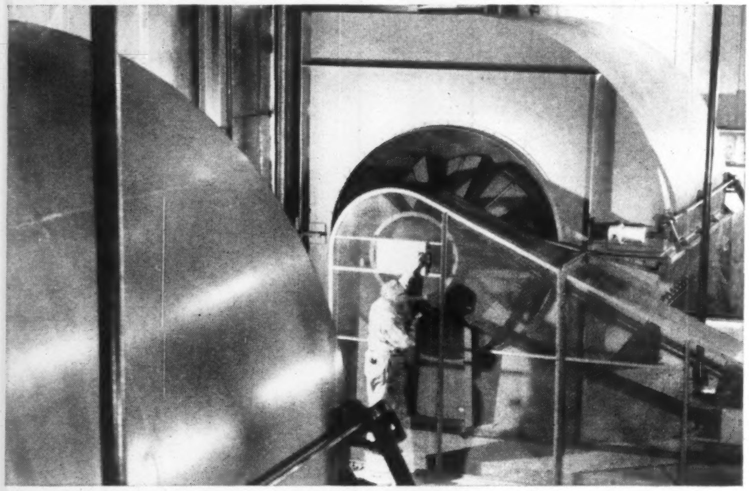
Crane Sunnywall Radiation*—most durable, most attractive made. Perfect companion to Sunnyday boilers. Shown with copper tubing, aluminum fins. Also available in all steel. Lineal foot capacities from 700 to 2900 Btu.*



Crane Sunnyaire Unit Heaters *for steam or hot water. Available for horizontal or vertical discharge. Complete range of sizes. Type HV, illustrated, available up to 684,000 Btu per hour.*

1000 TON CAPACITY PLANT

...air conditions Des Moines newspaper building. 375,000 c.f.m. air circulation!



Two huge Chicago Blower centrifugal airfoil fans handle 375,000 c.f.m. of air in supplying cool, conditioned air throughout the newspaper plant and office areas. Special "Chicago" aerodynamic fan blade design keeps noise level at an absolute minimum.

AIR CONDITIONING MILESTONE

DES MOINES—The combination 13- and 4-story Register-Tribune building is the only large newspaper publishing plant to be successfully air conditioned throughout from a single air handling unit.

WIDE TEMPERATURE RANGE

In addition to fitting duct work into an almost impossible structural situation, the engineer was faced with widely varying room temperatures that result from the amazing variety of operations performed in a newspaper plant. Under one roof and in close proximity are hot stereoptyping operations, typesetting, darkroom facilities, wire service functions as well as office areas where humans work feverishly to satisfy the news demands of ever-humming, ever-hungry printing presses.

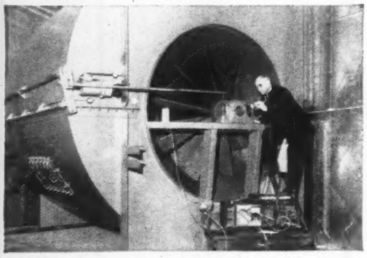
CHICAGO BLOWERS CIRCULATE 375,000 C.F.M. OF AIR THROUGH 1½ MILLION CUBIC FT. AREA

"One of the toughest problems," according to Mr. Wm. E. Nanes, consulting engineer, "was the cool air circulating fans."

"The Register-Tribune people specifically requested the quietest fans available. It turned out that Chicago Blower Corporation could meet our needs on both counts. They had the capacity we wanted and their special hollow-sectioned air foil blade construction made the fans surprisingly quiet."

92% EFFICIENCY WITH LESS POWER

Two Chicago Blower fans, whose housings are 15′ high, were used. Each fan rotor is over 7′ in diameter and weighs 3000 pounds. Because the blades are aerodynamically designed, similar to an airplane wing, eddy currents responsible for turbulence and noise are virtually eliminated. Fan efficiencies are an amazing 92% and they operate on less power. Noise level over similar capacity units is reduced as much as 40%.



Chicago Blower makes it standard procedure to give all large blower installations a final field balancing.

CHICAGO BLOWER ENGINEERING ASSISTANCE ALWAYS AVAILABLE

Chicago Blower plant and field engineers are always on call to assist firms working on heating and ventilating problems. They bring to any job a wealth of time-, trouble-, and money-saving information gained on thousands of installations.

7207

CHICAGO

CHICAGO BLOWER CORPORATION
9869 Pacific Avenue • Franklin Park, Illinois • GLadstone 1-0333

Your local
Chicago Field
Engineer is in the
'Yellow Pages'

Want all the facts about this aerodynamically-designed fan? Ask your "Chicago" field engineer for a copy of Bulletin A-103. You will find him listed under "Fans," "Blowers," or "Ventilating Equipment and Supplies" in the YELLOW PAGES of your phone book. If you prefer, write or call direct and complete information and service will be provided.

Up to 30 tons

IN A SINGLE UNIT

WITH THESE REMOTE

McQuay

Air Cooled Condensers

for Waterless Refrigeration and Air Conditioning

Here is the finest, the most efficient, most versatile and the most complete line of remote air cooled condensers on the market.

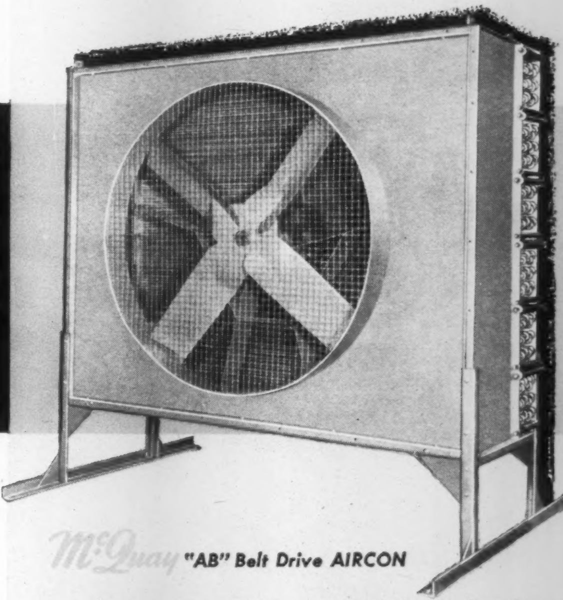
McQuay Aircons are designed in two types—direct drive models for commercial and industrial air conditioning and refrigeration applications, and belt drive models up to 30 tons capacity in a single unit for larger condensing requirements, such as air conditioning and refrigerating supermarkets, shopping centers, office buildings or large industrial plants.

All McQuay Aircons are designed for multiple circuiting, so that two or more separate refrigeration systems can be connected to the same condenser.

Full Winter Efficiency with McQuay "Seasontrol"

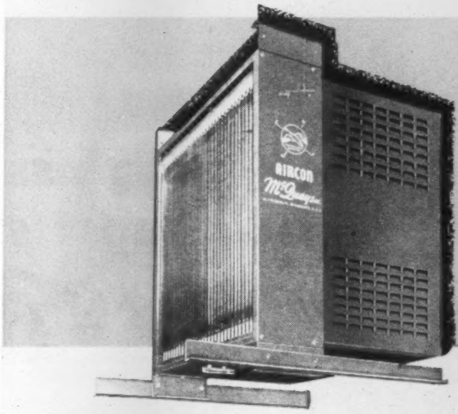
McQuay Aircons operate at peak performance in winter as well as in summer. The McQuay "Seasontrol" modulates the condenser capacity in accordance with the weather for proper operation at all times.

For best results with waterless air conditioning or refrigeration, look to the McQuay Aircon line of remote air cooled condensers with Ripple Fin coil construction, of course. There is a McQuay representative in every principal city, or write McQuay, Inc., 1601 Broadway St., N.E., Minneapolis 13, Minn.



McQuay **"AB" Belt Drive AIRCON**

remote, waterless condensers available in six sizes, 9, 11, 15, 20, 25 and 30 ton nominal capacities in individual units with single fan and motor assemblies. Coils constructed of copper tubes with McQuay Ripple Aluminum Fins. Lifetime ball bearing and slow speed propeller type fan.



McQuay **"AD" Direct Drive AIRCON**

remote, waterless condensers available in 2, 3 and 5 ton nominal capacities. Quiet propeller type fan, statically balanced. ⅜ in. O.D. copper tubes, vertical free draining parallel feed. McQuay Ripple Fins pressure bonded to copper tubing.

McQuay Means Quality

AIR CONDITIONING • HEATING • REFRIGERATION

MAKE THE SEASONS COME TO YOU

McQuay INC.

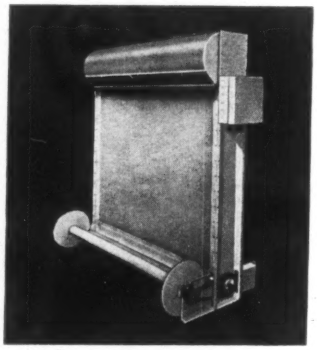
from broken glass—the world's most successful air filter

the one and only AAF *Roll*-O-MATIC

Today's "miracle" media in air filtration is Roll-o-mat, developed specially for the Roll-O-Matic air filter. This fluffy white blanket of bonded glass fibers features graduated density from front to back, yet compresses to paper-like thinness on the roll.

It's pre-charged with AAF viscosine, a product specially developed to retain its non-oily consistency under all temperature and humidity conditions. One roll of media lasts a full year in normal use, and changing media is as simple as changing the film in a camera!

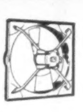
If you want Roll-O-Matic performance—automatic operation, high air cleaning efficiency and practically no maintenance . . . all at a cost less than half that of throwaway filters—*specify* Roll-O-Matic. There's no other way to get it. Contact your local AAF representative or write for Bulletin No. 248A.



AAF American Air Filter
COMPANY, INC.
373 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

herman nelson

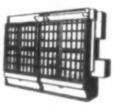
Herman Nelson Unit Blowers



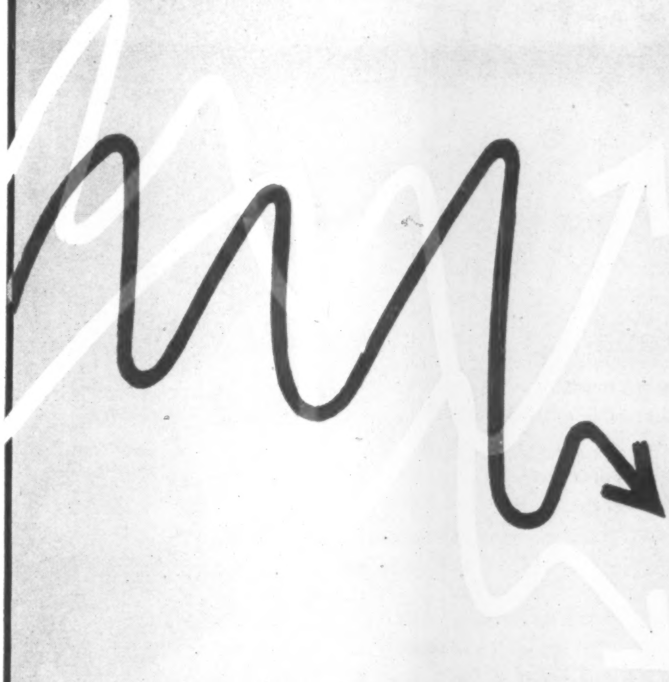
Herman Nelson Propeller Fans

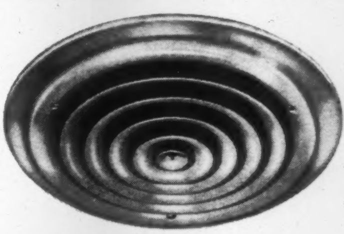
— BETTER AIR IS OUR BUSINESS —

Illinois Heating Specialties

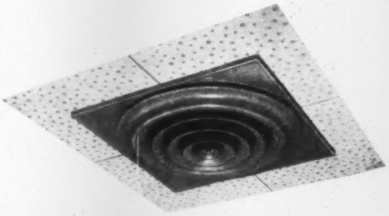


Air Filters and Precipitators

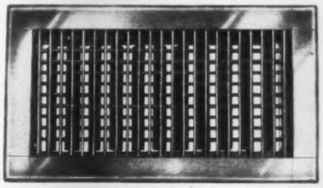




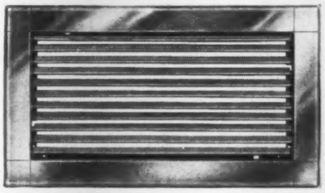
H&C NO. 16 DIFFUSAIRE® . . .



WITH H&C NO. 18 ADAPTER SQUARE



H&C NO. 92 VHV TRIPL-AIRE® **MULTI-DEFLECTION REGISTER.** Vertical face bars, horizontal secondary bars, vertical louvers.



NO. 94A FIXT-AIRE® **GRILLE.** Horizontal face bars set at 22° angle to conceal duct.

for IDEAL AIR DISTRIBUTION IN ALL COMMERCIAL AIR CONDITIONING INSTALLATIONS

The H&C No. 16 (step-down type) Ceiling Diffusaire, and its companion piece No. 15 (flush type) Diffusaire give you full 360°, draftless air distribution, particularly important in cooling. And with the H&C ADAPTER SQUARE, which harmonizes perfectly with acoustical tile ceilings, you have the "Round and Square" diffuser problem completely licked. There's no necessity of stocking more than one type diffuser. A butterfly damper with screwdriver adjustability from below is available with these diffusers.

For all other installations H&C TRIPL-AIRE and FIXT-AIRE Registers and Grilles provide every desirable factor entering into the achievement of perfect air conditioning: There are 10 types, 26 standard sizes of single and multi-deflection Grilles and Registers . . . providing 260 possible horizontal and vertical deflection combinations . . . plus a wide range of intermediate sizes. Consequently, there's never a need to compromise . . . the EXACT deflection is always available to you. Perfect volume control, equal distribution over the entire register face, "Decorator Gray" finish and prompt deliveries are other features that contribute to total satisfaction.

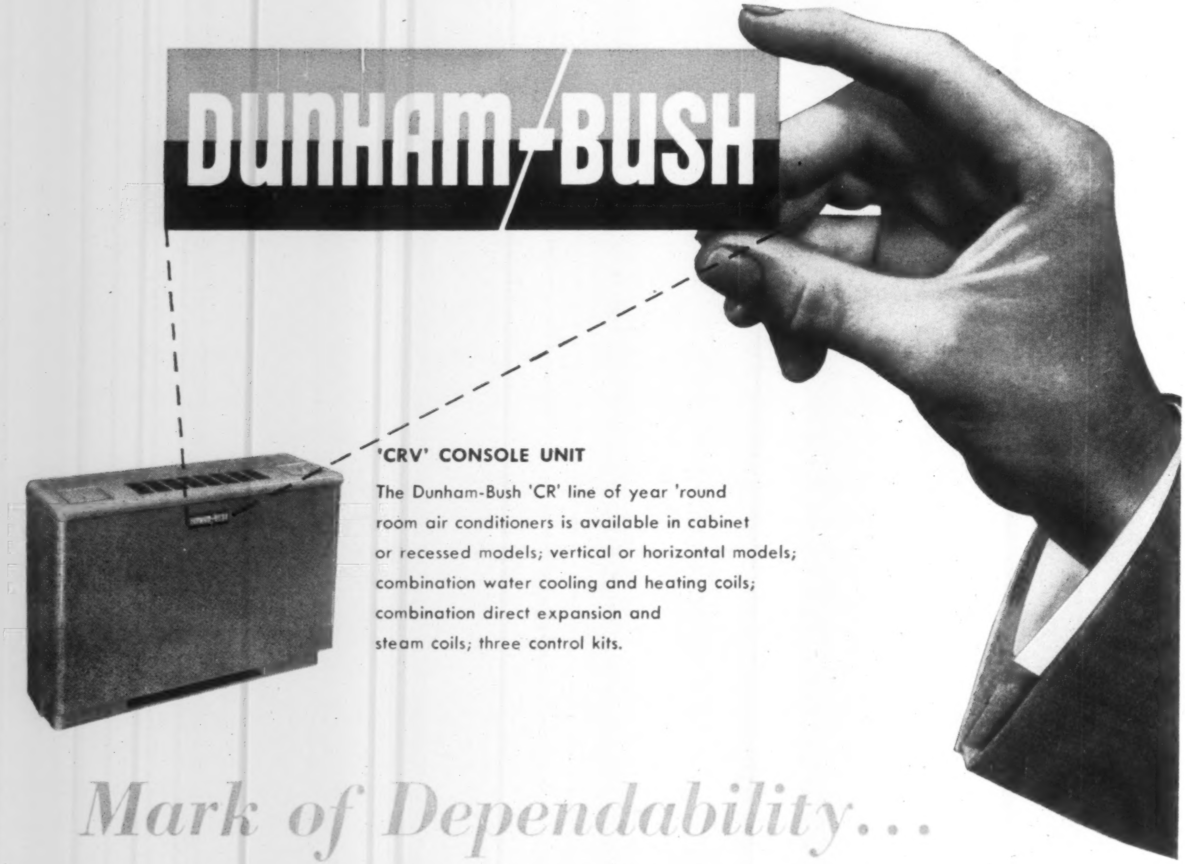
CONVENIENT CATALOG GIVES COMPLETE DETAILS AND ENGINEERING DATA. AVAILABLE FROM H&C JOBBERS OR DIRECT FROM US.

H&C

HART & COOLEY
MANUFACTURING CO.
508 EAST EIGHTH ST. • HOLLAND, MICHIGAN
IN CANADA: HART & COOLEY MANUFACTURING CO.
FORT ERIE, ONTARIO

WORLD'S LARGEST PRODUCERS OF REGISTERS and GRILLES

MEMBER
INDOOR COMFORT



'CRV' CONSOLE UNIT

The Dunham-Bush 'CR' line of year 'round room air conditioners is available in cabinet or recessed models; vertical or horizontal models; combination water cooling and heating coils; combination direct expansion and steam coils; three control kits.

Mark of Dependability...

IN AIR CONDITIONING • REFRIGERATION • HEATING

Members of the Dunham-Bush family have been serving the air conditioning, refrigeration and heating industries for an amazing total of 167 years.

This more than a century and a half of heat transfer experience is your assurance of *dependable* products.

And you can depend on the man behind the product... the Dunham-Bush sales engineer. He's ever available ... near your town ... to assist you. His technical skills aid you in *three* great industries.

May we send him your way to talk about the "CR" line and other great dependable products by Dunham-Bush!

For One Source—One Responsibility, look to...

Dunham-Bush, Inc.

DUNHAM-BUSH

WEST HARTFORD 10 • CONNECTICUT • U. S. A.

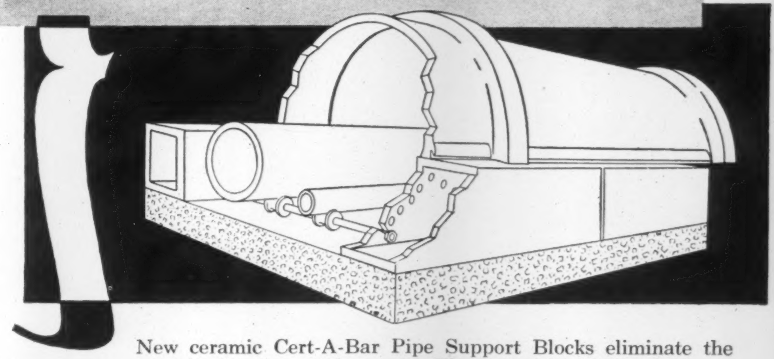
MICHIGAN CITY, INDIANA • MARSHALLTOWN, IOWA • RIVERSIDE, CALIFORNIA • UTICA, NEW YORK

SUBSIDIARIES

heat-x HEAT-X, INC. BREWSTER, N.Y. · DUNHAM-BUSH DUNHAM-BUSH (CANADA), LTD. TORONTO, CANADA · BRUNNER THE BRUNNER CO. GAINESVILLE, GA. · DUNHAM-BUSH DUNHAM-BUSH, LTD. LONDON, ENGLAND

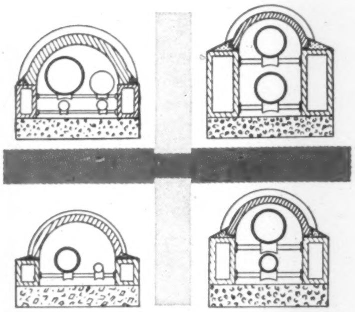
PERMANENT PROTECTION for underground piping!

STILLWATER
CERT-A-BAR*
TUNNEL
CONDUIT
SYSTEM



New ceramic Cert-A-Bar Pipe Support Blocks eliminate the need for interior cast iron rests. The perforated block is laid as a structural support member at regular intervals, and the bars are simply inserted and locked in place.

THE vital consideration in selecting an underground conduit system is *permanent* protection . . . not for one year or five, *but for the life of the piping.* You get the best possible protection for your underground metal service piping with a Stillwater Conduit System of vitrified clay. It's chemically inert—can't rust, rot, corrode, or decay . . . ever. And it is manufactured in accordance with ASTM specification C-13-54, assuring proper strength and quality. Any combination of service piping can be protected. Conduit is available in a wide range of sizes, with a complete line of fittings and accessories, including alignment guides, lateral guides, and anchors. Any contractor's crew can handle the installation easily, or if you prefer, Stillwater Licensed Installers will assume the responsibility. The Cert-A-Bar Tunnel System can be installed with any of three suggested new waterproofing specifications —one for average conditions, one for intermittent ground water conditions, and a third for high water table conditions. It's the lowest-cost conduit per year of service that you can specify or install!



THE CERT-A-BAR SYSTEM HAS ALL THESE IMPORTANT ADVANTAGES

- Inherent structural strength for permanent protection
- Complete flexibility for design
- Minimum initial and long-term costs
- Quickly installed
- Keeps pipe insulation dry
- No electrolytic corrosion of piping
- No maintenance required

A few of the hundreds of possible combinations of piping for the Cert-A-Bar Tunnel System are shown at left.

WRITE FOR

illustrated, four-page circular with complete installation specifications.

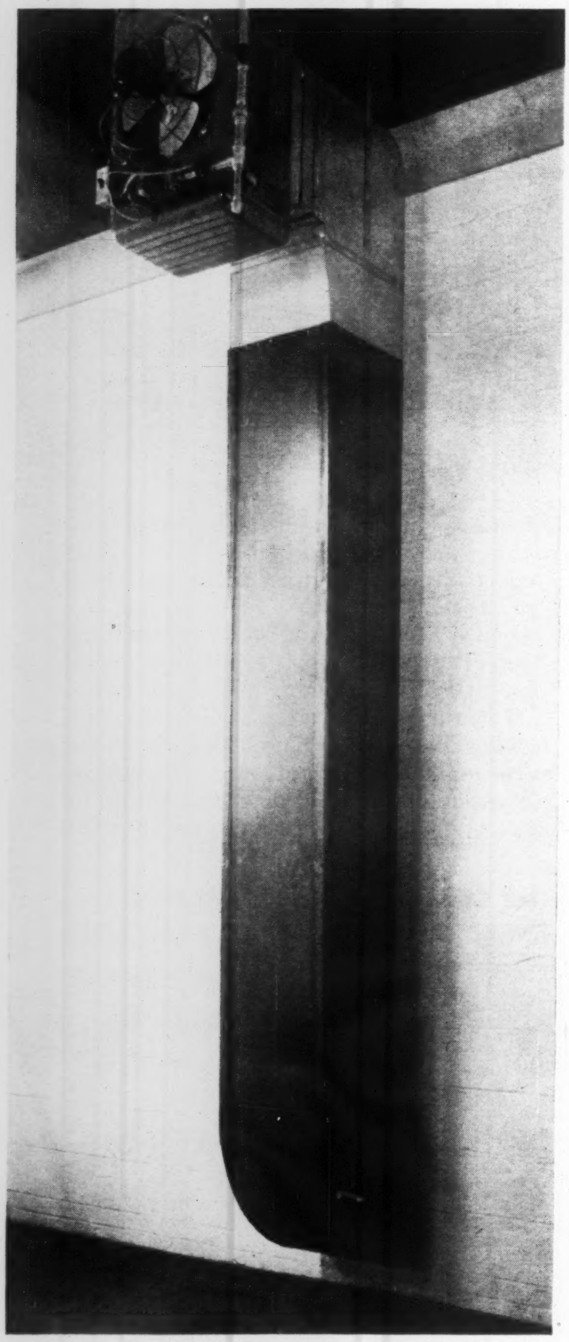
*T.M. Reg. App. For.
Patents Pending

The Stillwater Clay Products Co.
STILLWATER CONDUIT DIVISION
3334C Prospect Avenue, Cleveland 15, Ohio

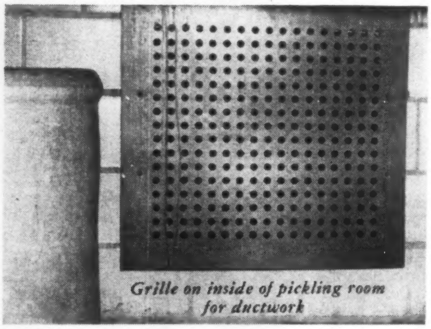
STILLWATER
CONDUIT
SYSTEMS

Another new development using

B.F.Goodrich Chemical *raw materials*



Duct carrying heat for pickling room fabricated by Colonial Plastics Mfg. Co. using rigid vinyl sheeting made from Geon. B.F.Goodrich Chemical Company supplies the Geon polyvinyl material.



Grille on inside of pickling room for ductwork

duct of **GEON RIGID VINYL** withstands acids... outlasts metal

ORDINARY metal duct just can't take nitric, sulphuric and muriatic acid fumes. So a large municipal utility has turned to ductwork made from rigid sheets of Geon polyvinyl materials to heat a water meter pickling room, where these acid fumes are present. The duct replacement problem, due to corrosion, is over.

Besides being acid resistant, this ductwork withstands impact, moisture, and oils. The duct and grille were fabricated with ease—conventional sheet-metal forming machinery was used for shearing, bending and punching; welds were made simply and quickly with solvent cement. The light weight of the rigid vinyl assembly made installation speedy.

Rigid vinyl sheets made of Geon material are available from many manufacturers in large sizes, in a range of gauges, in normal or high impact grades. In many places where there's corrosion, they are ideal for ducts, fans, hoods and fume stacks.

You can get a booklet on properties of rigid Geon materials. Write Dept. FL-5, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ont.

A trade mark of B.F.Goodrich Chemical Company

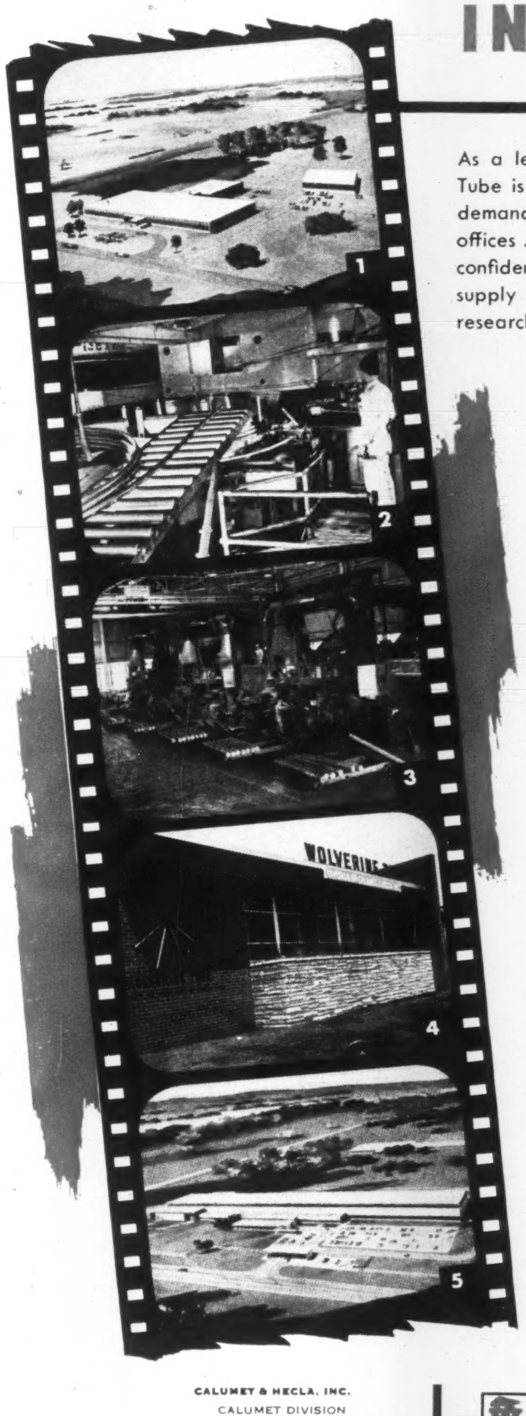
Geon
Polyvinyl Materials

A division of the B.F. Goodrich Company

B.F.Goodrich Chemical Company
a division of the B.F.Goodrich Company

B.F.Goodrich **GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors**

WOLVERINE HAS CONFIDENCE IN THE FUTURE



As a leading supplier of tubing and tubular components, Wolverine Tube is currently expanding its facilities to keep pace with increasing demand for its products by American industry. New plants . . . new offices . . . new equipment . . . illustrated at the left reflect Wolverine's confidence in the future. They symbolize Wolverine's determination to supply its growing markets with products and services conceived in research and produced through Tubemanship.

1. Currently under construction in Allen Park, Michigan, are Wolverine's new administrative offices and research center. These modern buildings are located on 7½ acres of ground—provide ample room for future expansion.

2. Towering high into the air at Wolverine's Detroit plant is this giant bullblock—part of the major modernization program now underway. The unit—one of a battery—is capable of drawing and coiling tubing at an unusually high production rate per hour.

3. Pictured here is a section of the expanded casting department at Wolverine's plant in Decatur, Alabama. The Decatur plant with its 450,000 square feet of floor space, has been called the "World's Most Modern Tube Mill".

4. To insure customer convenience, Wolverine maintains sales offices and mill depots in many American cities. The modern buildings reflect Wolverine's forward thinking in its approach to sales and marketing functions.

5. In Canada, Wolverine tubing will be produced early in 1958 in this multi-million dollar tube mill currently under construction at London, Ontario. This mill, the only one in Canada devoted exclusively to the production of non-ferrous tubing, will also manufacture Wolverine tube for export to world markets.

Yes, Wolverine Tube has confidence in the future—a confidence that is based on progress through performance and steady achievement. For more information about Wolverine and its products write for your copy of the Wolverine Tubemanship Book.

CALUMET & HECLA, INC.
CALUMET DIVISION
WOLVERINE TUBE DIVISION
FOREST INDUSTRIES DIVISION
CALUMET & HECLA OF CANADA LIMITED
CANADA VULCANIZER AND EQUIPMENT COMPANY LIMITED

WOLVERINE TUBE
Division of Calumet & Hecla, Inc.
1461 CENTRAL AVE., DETROIT 9, MICH.
Manufacturers of Quality-Controlled Tubing and Extruded Aluminum Shapes

6162

PLANTS IN DETROIT, MICHIGAN, AND DECATUR, ALABAMA. SALES OFFICES IN PRINCIPAL CITIES.
EXPORT DEPARTMENT, 13 EAST 40TH STREET, NEW YORK 16, NEW YORK

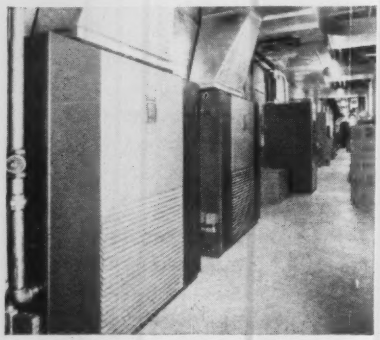
FREON * REFRIGERANTS IN AIR CONDITIONING

Field Reports About Successful Installations

70-store shopping center air conditioned with package units

Remotely located General Electric package units air condition all 70 stores at the big Dixie Manor Shopping Center, Louisville, Ky. Installation capacities range from 3 to 142½ tons per store.

The compact G-E package units provide two-stage modulated cooling via ducts to wall and ceiling diffusers. Store areas are divided into zones, each served by a single unit. Gas-fired furnaces deliver warm air through the same ductwork for winter heating.



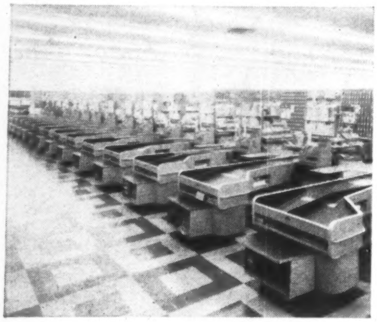
Ward Refrigeration and Engineering Co. installed all package units and mechanical equipment at Dixie Manor. The shopping center's management chose a single supplier-contractor in order to standardize and simplify servicing.

Largest installation at Dixie Manor uses 10 units, totaling 142½ tons, to air condition 60,000 sq. ft.

Top performance in large-scale air conditioning with package units is strikingly demonstrated at the Ben Snyder department store (above). Biggest tenant in the 70-store Dixie Manor Shopping Center, Louisville, Ky., Snyder's 60,000-sq.-ft. area is cooled by one 7½-ton and nine 15-ton G-E units. To save space, units are installed outside the conditioned area.

Each package unit delivers two-stage modulated cooling through wall and ceiling diffusers to a specific zone in the store. This arrangement makes possible a flexible system of local temperature control.

Another installation of package units for cooling large areas is at the Park & Shop Super Market (above) in Dixie Manor. Said to be the largest supermarket in the United States, Park & Shop uses six 15-ton G-E units to air condition its 46,000-sq.-ft. area.



You can specify a "FREON" refrigerant for any air conditioning or refrigeration application

"Freon-22" refrigerant is used in G-E package units to help assure years of trouble-free performance. No component of a cooling system is more important than the refrigerant. That's why you should always specify "Freon" for the jobs you do.

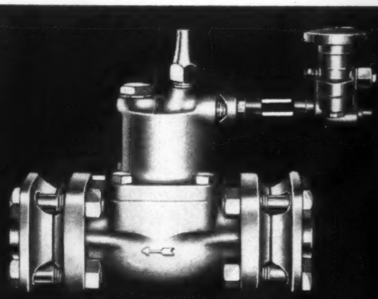
You can be sure "Freon" refrigerants will never give you any trouble from acids or moisture. "Freon" refrigerants are safe—nonflammable, nonexplosive, virtually nontoxic. Your complete air conditioning and refrigeration wholesaler can promptly supply a "Freon" refrigerant for any size or type of installation.

For more information or technical data on uses of "Freon" write to E. I. du Pont de Nemours & Co. (Inc.), "Freon" Products Division 710, Wilmington 98, Del.

FREON® REFRIGERANTS

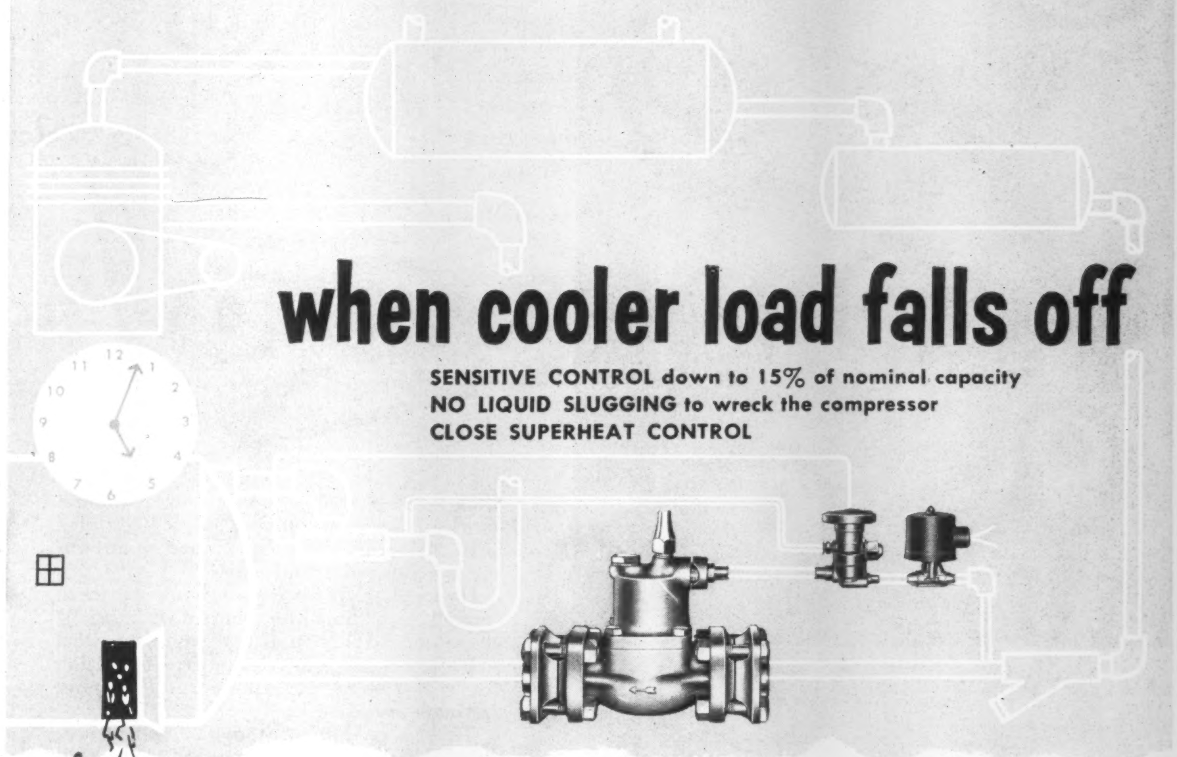
**Freon and combinations of Freon- or F- with numerals are Du Pont's registered trademarks for its fluorinated hydrocarbon refrigerants.*

DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY



alco's PO valve

maintains control



when cooler load falls off

SENSITIVE CONTROL down to 15% of nominal capacity
NO LIQUID SLUGGING to wreck the compressor
CLOSE SUPERHEAT CONTROL

That's why Alco is recommended so often for chiller applications with wide ranges of load and capacity.

Why worry about compressor failure? Install Alco and relax!

Capacities: 20 to 200 tons, F-12 and F-22

Buy Alco . . .
The System Shows the Difference

Write for Bulletin No. 189-57

The one complete line of refrigerant controls that insures product quality: Thermostatic Expansion Valves, Refrigerant Distributors, Solenoid Valves, Suction Line Regulators, Flooded Evaporator Controls, and Reversing Valves.

ALCO

ALCO VALVE CO.

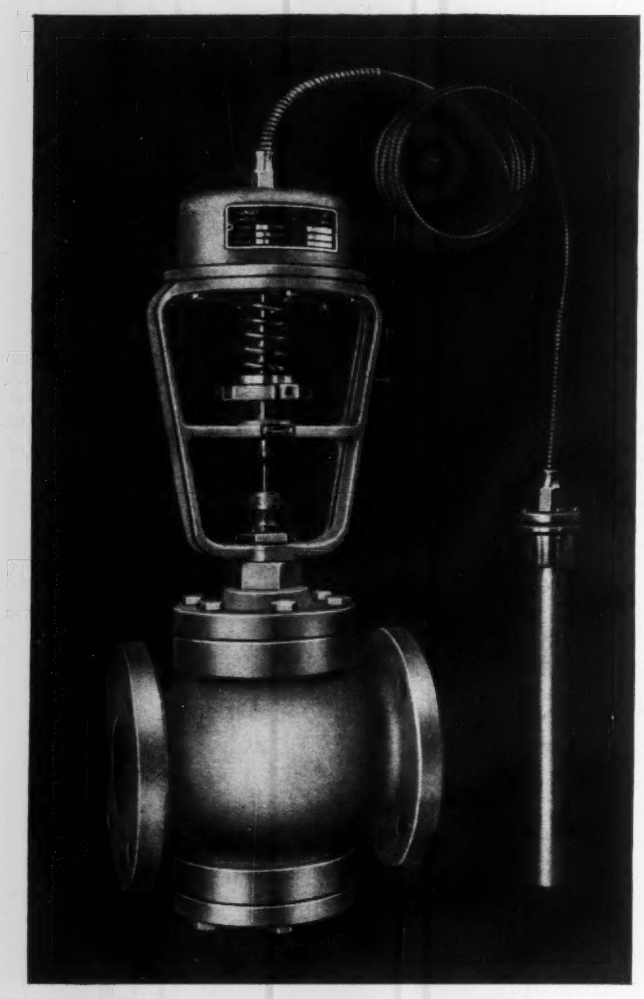
861 KINGSLAND AVE. • ST. LOUIS 5, MO.

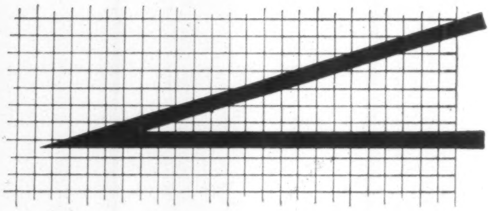
7600

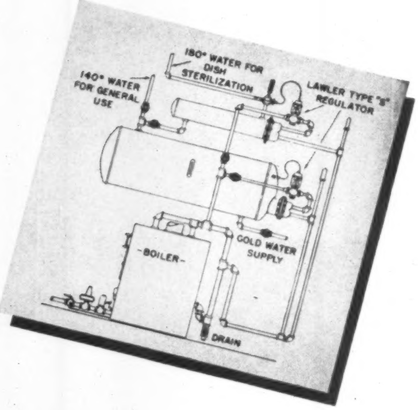
SEE YOUR ALCO WHOLESALER

INSTANT PROTECTION...

PRECISION CONTROL!






180° WATER FOR DISH STERILIZATION
140° WATER FOR GENERAL USE
LAWLER TYPE "S" REGULATOR
COLD WATER SUPPLY
-BOILER-
DRAIN

LAWLER TYPE "S" TEMPERATURE REGULATOR

DIRECT ACTING — Accurately controls all steam heating equipment. Protects against over heating . . . a rise in temperature above setting closes valve.

REVERSE ACTING — For cooling systems and recirculating lines. Rising temperature opens valve . . . drop in temperature causes valve to close.

THREE WAY — Mixes hot and cold liquids . . . delivers them at a constant pre-determined temperature.

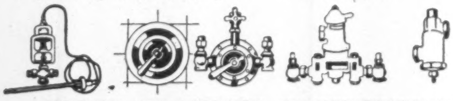
ONE DEGREE OFF — up or down, and the Lawler Type "S" Temperature Regulator is in action . . . correcting to and maintaining the desired temperature.

Hydraulically formed bellows are non-ferrous, give "hair-line" control with instant response. Highly polished stainless steel valve stem provides friction-free operation for real rugged performance . . . longer lasting durability.

There's no job too tough . . . too unique for the Type "S". It's available in many variations for any special purpose. In industry, dairies, food processing, Diesel engineering . . . where ever steam, gases or fluids are used, the Lawler Type "S" Temperature Regulator will do an excellent control job for your customer.

THE *Lawler*

PERFORMANCE TESTED FOR LONGER LIFE



Steam Temperature Regulators
Thermostatic Shower Mixing Valves
Water Controllers
Tempering Valves

DESIGNERS AND PRODUCERS OF THERMOSTATICALLY OPERATED VALVES SINCE 1895

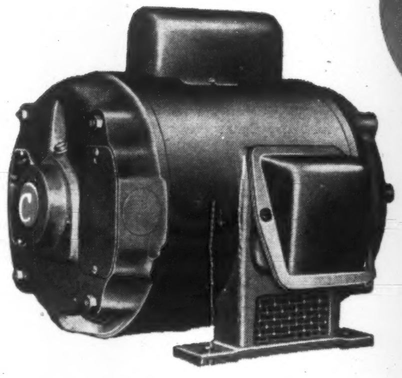
Line of Thermostatic Control Valves

LAWLER AUTOMATIC CONTROLS, INC., MT. VERNON, N. Y.

Your choice of normal or low starting current...

with Performance-Rated Century

SINGLE-PHASE, HIGH TORQUE MOTORS FOR OIL FIELD USE

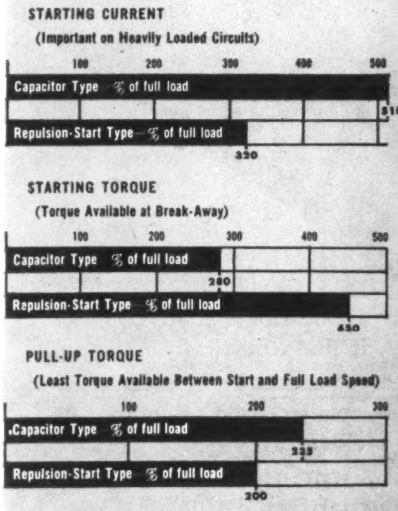


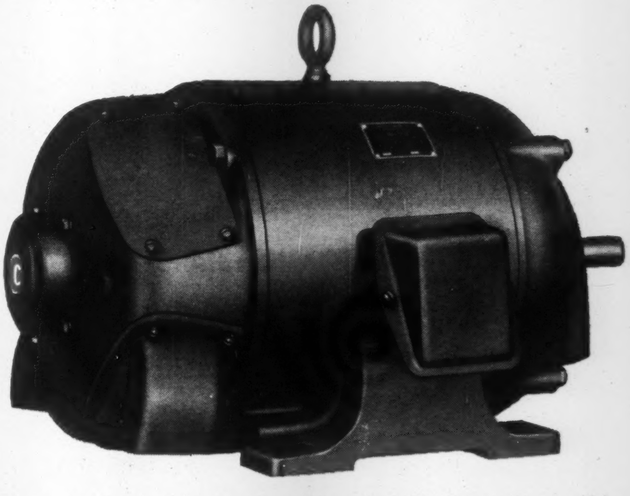
Capacitor Motors... ⅛ to 20 H.P. provide high starting torque, high pull-up torque and require normal starting current. They are available in drip proof, dust proof and explosion proof enclosures.

Even if you have severe starting current limitations, you can select the torque you need for sure starts and smooth pull-up to speed from the Century Performance-Rated Single-Phase line (see bar chart below for operating characteristics of two types of Century Single-Phase Motors).

Whatever Your Oil Field Motor Job... there's a Century Motor Performance-Rated to handle it with top effectiveness. For added outdoor protection, Century *Weather-Gard* Motors have openings screened to keep out rodents. Check with your supply store, or Century branch office.

TYPICAL OPERATING CHARACTERISTICS





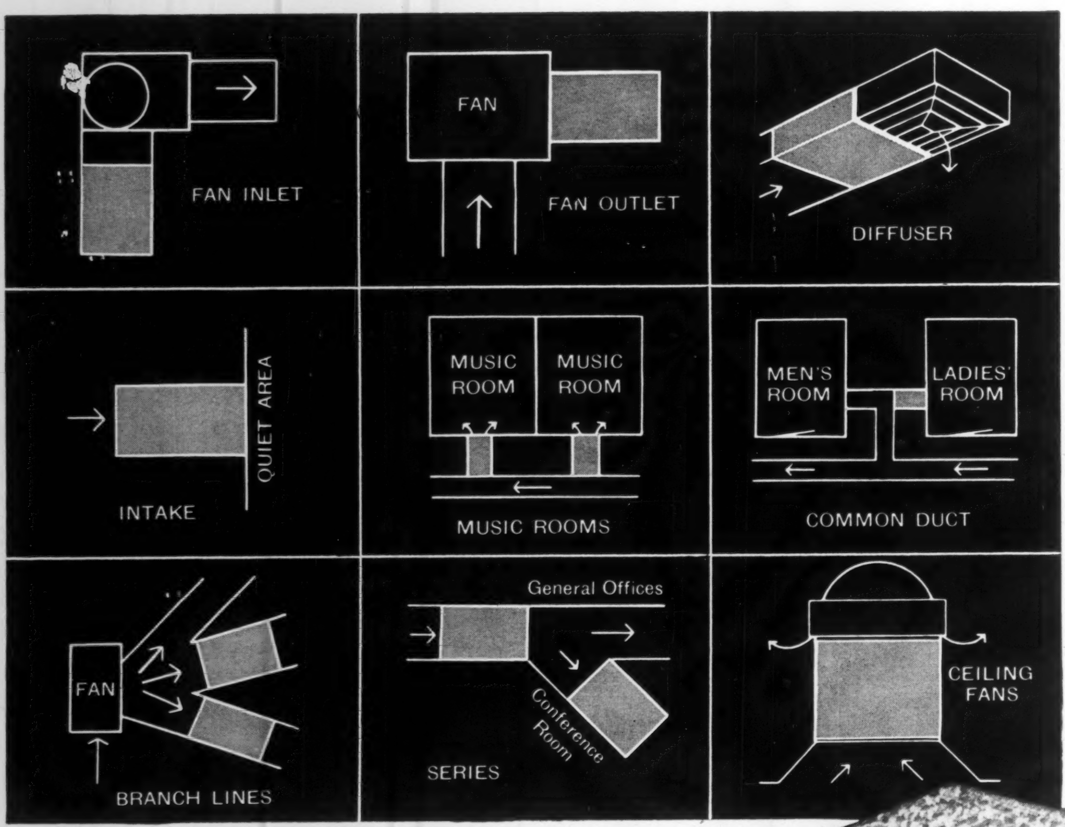
Repulsion Start, Induction Motors (type RS)... ½ to 7½ H.P. provide very high starting torque, yet require unusually low starting current. They are available in drip proof and splash proof enclosures.

Performance-Rated© Motors
⅛ to 400 H.P.

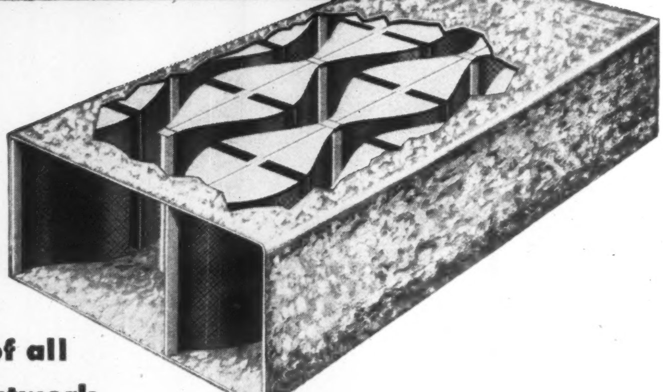
CENTURY ELECTRIC COMPANY

CE-32R

1806 Pine Street, St. Louis 3, Missouri • *Offices and Stock Points in Principal Cities*


FAN INLET
FAN
FAN OUTLET
DIFFUSER
QUIET AREA
INTAKE
MUSIC ROOM
MUSIC ROOM
MUSIC ROOMS
MEN'S ROOM
LADIES' ROOM
COMMON DUCT
FAN
BRANCH LINES
General Offices
Conference Room
SERIES
CEILING FANS

Every Building Needs *Aircoustat* Sound Traps



AIRCOUSTAT silences all noise of all frequencies traveling through ductwork

Eliminate disturbance, distraction and irritation caused by noises escaping from one area to another through ductwork.

Install AIRCOUSTAT Sound Traps. AIRCOUSTAT eliminates guesswork, wasted space and unnecessary expense of duct lining. You can guarantee your client trouble-free performance. You can estimate with complete confidence the performance of particular applications. If AIRCOUSTAT fits geometrically, it fits acoustically.

AIRCOUSTAT saves you space. Its greater effectiveness permits smaller-sized ducting. It eliminates bulky mufflers.

For more details, write to KOPPERS COMPANY, INC., Industrial Sound Control Dept., 6210 Scott Street, Baltimore 3, Md.

KOPPERS

INDUSTRIAL SOUND CONTROL

Engineered Products Sold with ***Service***

NEW TISHMAN BUILDING
3325 Wilshire Boulevard
Los Angeles, California

Air Conditioned

OF COURSE

with 35

McQuay

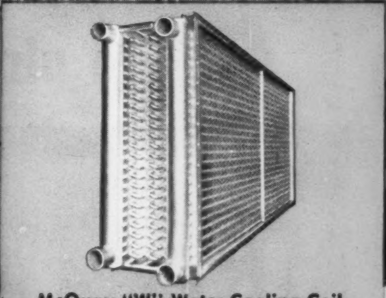
RIPPLE FIN COILS

ARCHITECT .... Victor Gruen Associates, Beverly Hills, California

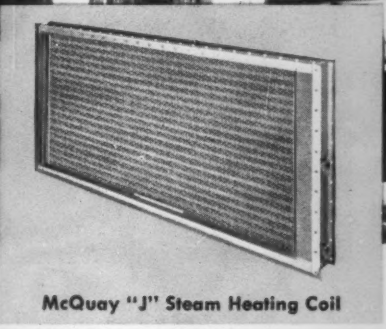
MECHANICAL ENGINEER .... Ralph E. Phillips, Inc., Los Angeles, California

MECHANICAL CONTRACTOR .... J. Herman Co., Inc., Los Angeles, California

The new, completely air conditioned Tishman Building is an example of the versatility of McQuay heating and cooling coils, as it was necessary to design this flexible system so that it would meet the space requirements of future tenants as the building became leased. McQuay heating and cooling coils were used in central supply systems located on every other floor which supply hot and cold air to a duct system which passes through the central part of the building. As floor space was rented, lateral duct run-outs were installed to precisely and economically serve the areas occupied. There is a McQuay heating or cooling coil to exactly meet the requirements of every heating, cooling or air conditioning job — and do it efficiently and economically with the lowest possible investment. Years of experience, years of research provide the know-how for which McQuay is famous.



McQuay "W" Water Cooling Coil



McQuay "J" Steam Heating Coil

McQuay "W" water cooling coils also utilize the famous Ripple Fin and staggered tube construction. Extremely flexible to expansion and contraction with supply and return connections at one end, for long life and simplified piping and service. Also available in a wide variety of sizes, styles and capacities, 1 to 10 rows. 23 McQuay "W" coils were used on the Tishman system.

McQuay "J" Steam heating coils have the exclusive Ripple Fin and staggered tube construction. Designed for use on heating, ventilating and special process applications, and are especially suitable for modulated steam control with uniform discharge temperatures. Extremely flexible under expansion and contraction. Made in a wide variety of sizes, styles and capacities to meet the requirements of every application. 12 McQuay "J" coils were used on the Tishman system.

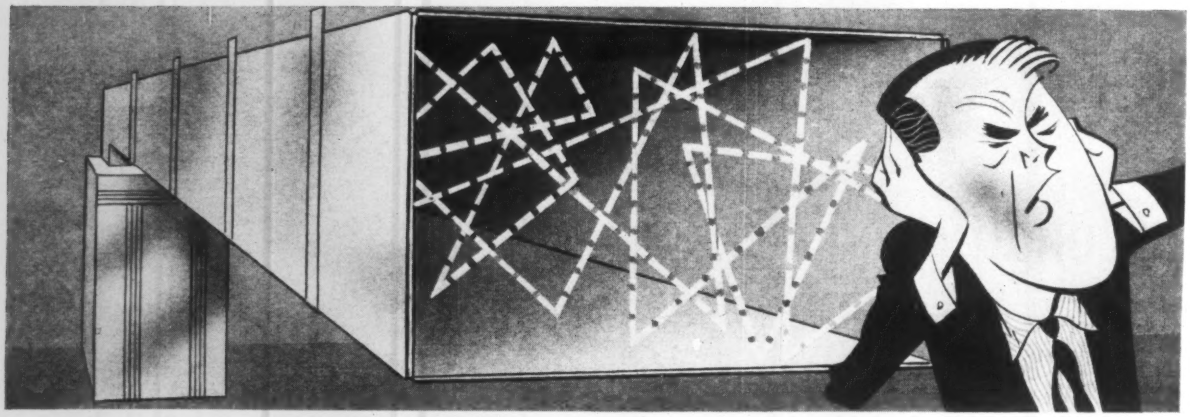
McQuay INC.

MAKE THE SEASONS COME TO YOU

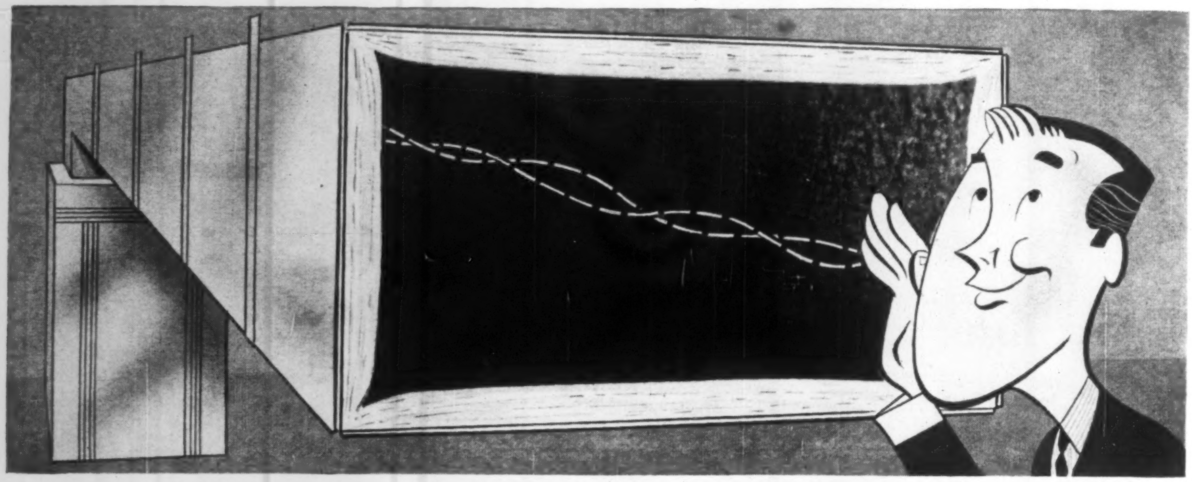
REFRIGERATION
HEATING
AIR CONDITIONING

McQuay
Means Quality

1601 Broadway St., N.E., Minneapolis 13, Minnesota · Representatives in all principal cities



Mute air-conditioning-duct noises...



with black-vinyl-coated MICROTEX

New duct liner has high acoustical and thermal efficiency . . . plus the moneysaving advantages of pigmented vinyl coating

Microtex Duct Liner effectively absorbs mechanical noises—particularly in the 250 to 4,000 cps range, where most air-conditioning and heating-system noises occur. It efficiently insulates warm- and cold-air ducts against heat transfer. When ducts are lined with Microtex, the sheet metal itself acts as a vapor barrier.

L·O·F Glass Fibers' Microtex Duct Liner saves time and money at the job site. Its black vinyl coating saves painting inside ducts, near grilles or large registers; eliminates the possibility of paint flaking off into the air stream. Pigmented vinyl quickly shows inspectors that Microtex Duct Liner is *fully coated* to resist air erosion, even at peak velocities. When ducts are lined, exterior surfaces are easy and economical to paint or finish as desired.

Microtex Duct Liner cuts costs in the shop, too. It's strong and resilient . . . easily withstands routine shop handling without damage. Microtex is semirigid, yet light in weight . . . easy to cut, pleasant to handle. Black vinyl clearly indicates the air-stream side as Microtex is applied to the sheet metal. Resiliency of Microtex permits forming insulated metal sheet in the brake without damage.

Get the facts today on economical Microtex Duct Liner in 1½, 2 and 3 lb./cu. ft. densities. Contact your distributor, or write: *L·O·F Glass Fibers Company, Dept. 39-107, 1810 Madison Avenue, Toledo 1, Ohio.*

L·O·F
GLASS FIBERS

L·O·F GLASS FIBERS COMPANY · TOLEDO 1, OHIO

WHEN FACED WITH A HIGH PRESSURE AIR MOVING JOB DEMANDING:

- MAXIMUM EFFICIENCY
- QUIET OPERATION
- SERVICE-FREE PERFORMANCE
- ADAPTABILITY TO VARIABLE INLET CONTROL
- EASE OF INSTALLATION

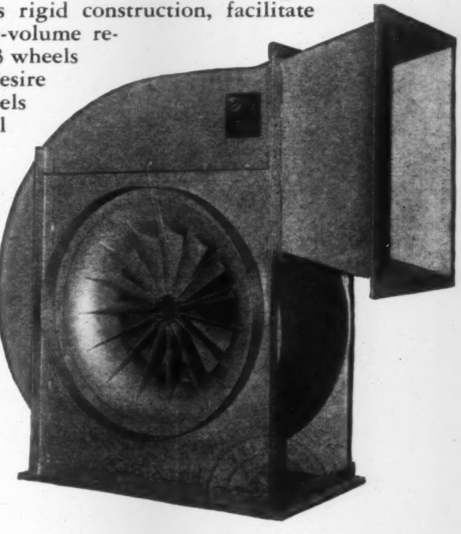
BUY AND SPECIFY "BUFFALO" AIRFOIL FANS

Where you want the above mentioned qualities in a system calling for Class II or heavier construction, this is the fan that will give complete satisfaction under most conditions.

The 92% mechanical efficiency of the Type "BA" Airfoil is an actual certified test figure, proved out time and again. And advantages don't stop there. Complete streamlining — inlet, wheel flange, wide-channel blades, housing and divergent outlet — provide a new level of quiet, smooth air handling and excellent static conversion in the duct. Ample flanges at inlet and outlet, plus rigid construction, facilitate installation. For various pressure-volume requirements, you have a choice of 3 wheels to deliver the performance you desire — as well as 3 semi-airfoil wheels closely approximating full-airfoil performance at lower cost.

Write today for Bulletin FD106 and check the "Q" Factor* that makes these fans your logical choice when you want the unqualified best in fans.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*



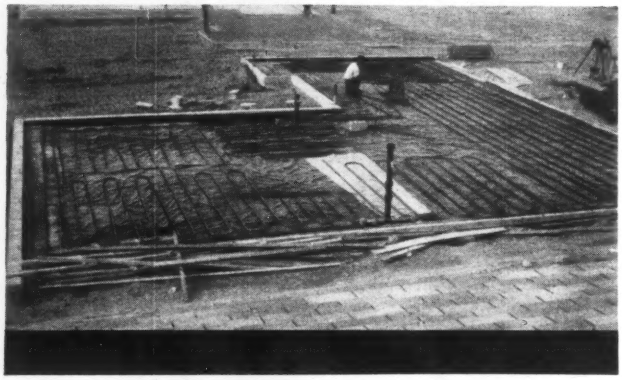
BUFFALO FORGE COMPANY

"Buffalo"

BUFFALO, N. Y.

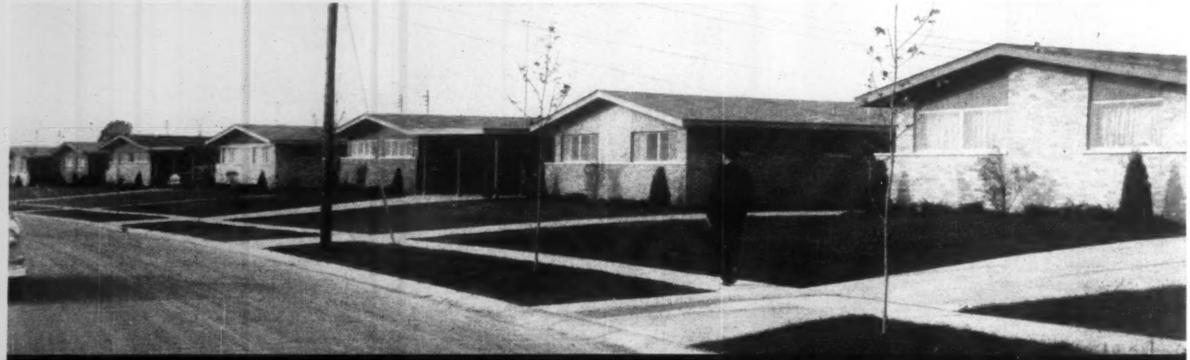
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING · AIR CLEANING · AIR TEMPERING · INDUCED DRAFT
EXHAUSTING · FORCED DRAFT · COOLING · HEATING · PRESSURE BLOWING



Youngstown steel pipe

. . . Gives Long, Maintenance-Free Life to Radiant Heating Installations



Youngstown Steel Pipe was installed by National Heating Co. in this 60-unit development of Modern Builders, Inc., both of Cincinnati, Ohio.

Specify Youngstown and secure these
7 Points of uniform goodness

- uniform ductility
- uniform lengths
- uniform threading
- uniform weldability
- uniform wall thickness and size
- uniform strength and toughness
- uniform roundness and straightness

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon, Alloy and Yoloy Steel
General Offices - Youngstown 1, Ohio
District Sales Offices in Principal Cities

Modern residential developments—like this 60-unit project off Cincinnati's Winton Road—demand only the most modern heating facilities. So, to afford these new homeowners warm, draft-free rooms of equalized temperatures, invisible radiant heating systems utilizing Youngstown Steel Pipe were installed.

For years Youngstown Steel Pipe has been specified by leading architects as well as progressive plumbing and heating contractors for its dependability and long life. That's because it's made of only the finest steel by steelmen with over half-a-century of steelmaking knowhow. All Youngstown operations from ore mining to finish threading are closely quality-controlled to give you the best piece of pipe obtainable anywhere. Why not make Youngstown your specification for long, trouble-free installations?

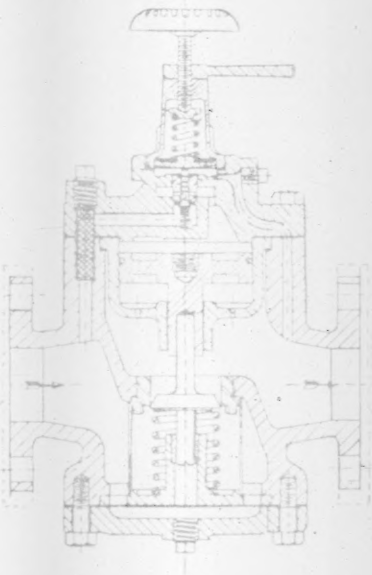
For additional information or service, contact your local Youngstown distributor—or phone our nearest District Sales Office, today.

PROVEN PERFORMANCE

at A. E. STALEY Mfg. Co.

CASH STANDARD Type 44

Pressure Reducing and Regulating Valve for Steam Service



Sudden changes in the requirements for hot water in the employees' shower rooms at the **A. E. Staley** plant, Decatur, Ill., demand full capacity range operation of the regulating valve with precise control of downstream pressure.

In April of 1956, a CASH STANDARD Type 44 Steam Valve was installed in the line supplying steam to the heater. **Gerald Hammond**, instrument engineer at **Staley**, reports: "The CASH STANDARD Type 44 has given exceptionally good service—the kind of service we expect from all CASH STANDARD products. It has required no maintenance since installation eight months ago."

What's your control problem? Use this dependable steam valve.

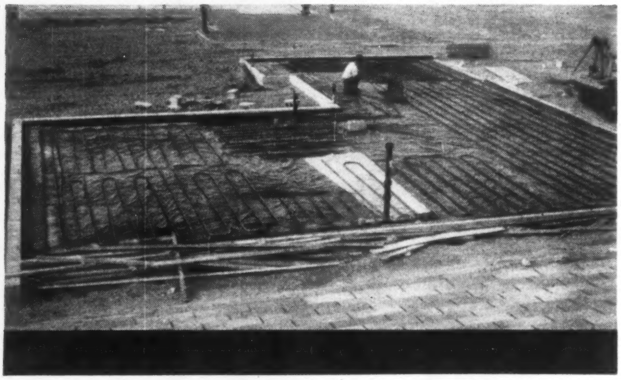
Built in Pilot and Main Valve Strainers • Internal Pilot-Operated, Piston-Actuated • Single Seat • Highly Sensitive, Responsive to Smallest Changes in Reduced Pressure • Maximum Inlet Pressure 250 PSI @ 400°F. • Delivery Pressure 5-250 PSI • Available with External Sensing Line • Sizes 2", 2½", 3", 4".

For an individual solution to your control problem, contact the CASH STANDARD specialist in your area, or write Dept. B

CASH CS STANDARD

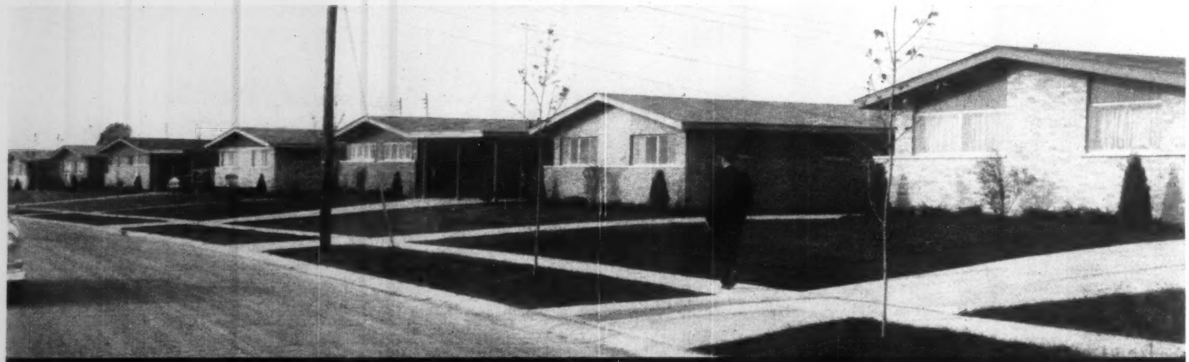
A. W. Cash Co. and Its Subsidiary, Cash Standard Stacon Corp.
P. O. Box 551, Decatur, Ill.

PRESSURE, HYDRAULIC, TEMPERATURE, PROCESS AND COMBUSTION CONTROLS



Youngstown steel pipe

. . . Gives Long, Maintenance-Free Life to Radiant Heating Installations



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For additional information or service, contact your local Youngstown distributor—or phone our nearest District Sales Office, today.

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY
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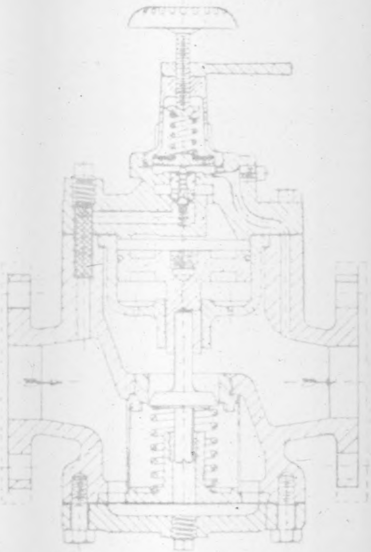

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PRESSURE, HYDRAULIC, TEMPERATURE, PROCESS AND COMBUSTION CONTROLS

ACCO
for Better Values

R-P&C VALVES

THE COMPLETE LINE
—DESIGNED FOR DEPENDABILITY

125 S
200 OWG
6
P&C CO
ELEC IRON

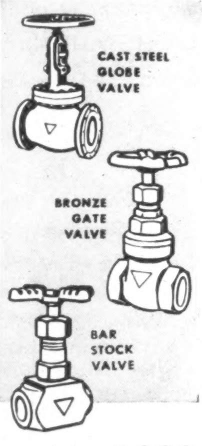
Created by R-P&C—made and sold exclusively by R-P&C...Electric Furnace Iron Valves

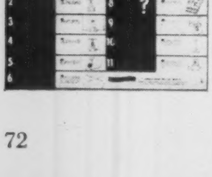
Electric furnace iron—introduced exclusively in R-P&C Valves—provides a high quality cast iron that meets the exacting requirements for pressure castings. Melted and refined under closest metallurgical supervision, R-P&C Electric Iron has physical properties *far exceeding the minimum standards* to which they must conform. It has a balanced chemical composition and a tough, dense body structure; and, it is more resistant to corrosion. All cast iron parts of R-P&C Valves are made of this Electric Furnace Iron.

Shown above is **Fig. 625**, a general service valve which is particularly applicable where full, unobstructed flow is desired. This type, available in bronze-trimmed or all-iron style, either flanged or screwed, is made in fifteen sizes, from 2″ to 24″—and is typical of the better values offered by the entire line of R-P&C Electric Iron Valves.

The R-P&C Line is Complete

The R-P&C line embraces gate, globe, angle and check valves in bronze, electric furnace iron and cast steel, and forged steel; all in a wide range of sizes, styles and pressure classes. Also, R-P&C offers specialties such as Lubrotite gate valves, bar stock valves, asbestos-packed cocks, cast steel fittings and pressure-seal cast steel valves. Order through your nearby R-P&C Distributor. For complete catalog, write our Reading office.





FREE WALL CHART
"How to Protect Your Valves"
Installation pointers, operating tips, clues to longer valve life. They are all on this 22″ x 17″ wall chart. Write for your free copy.

R-P & C VALVE DIVISION
AMERICAN CHAIN & CABLE

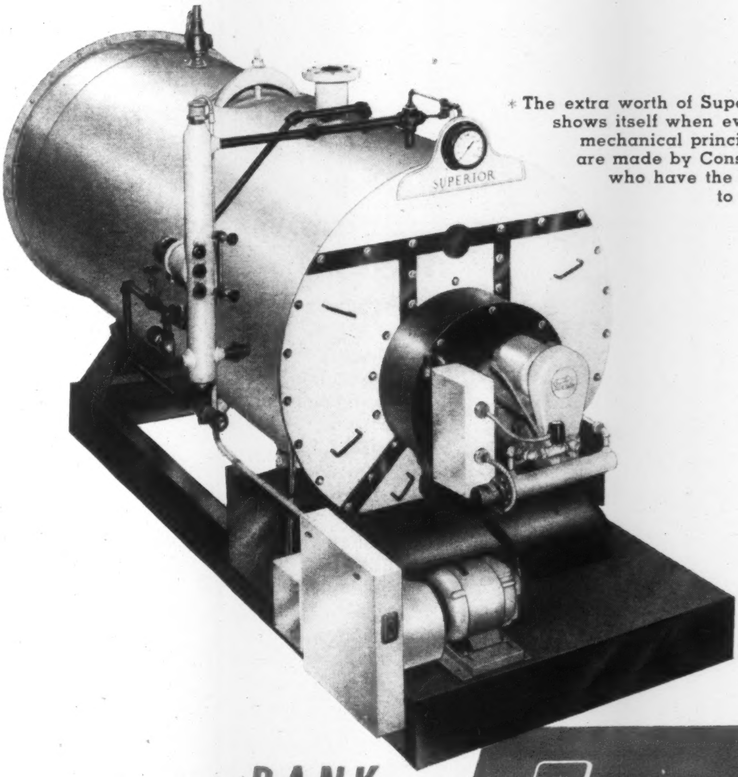
ACCO

Reading, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

TRADE MARK

the man to ask

is your ENGINEER*



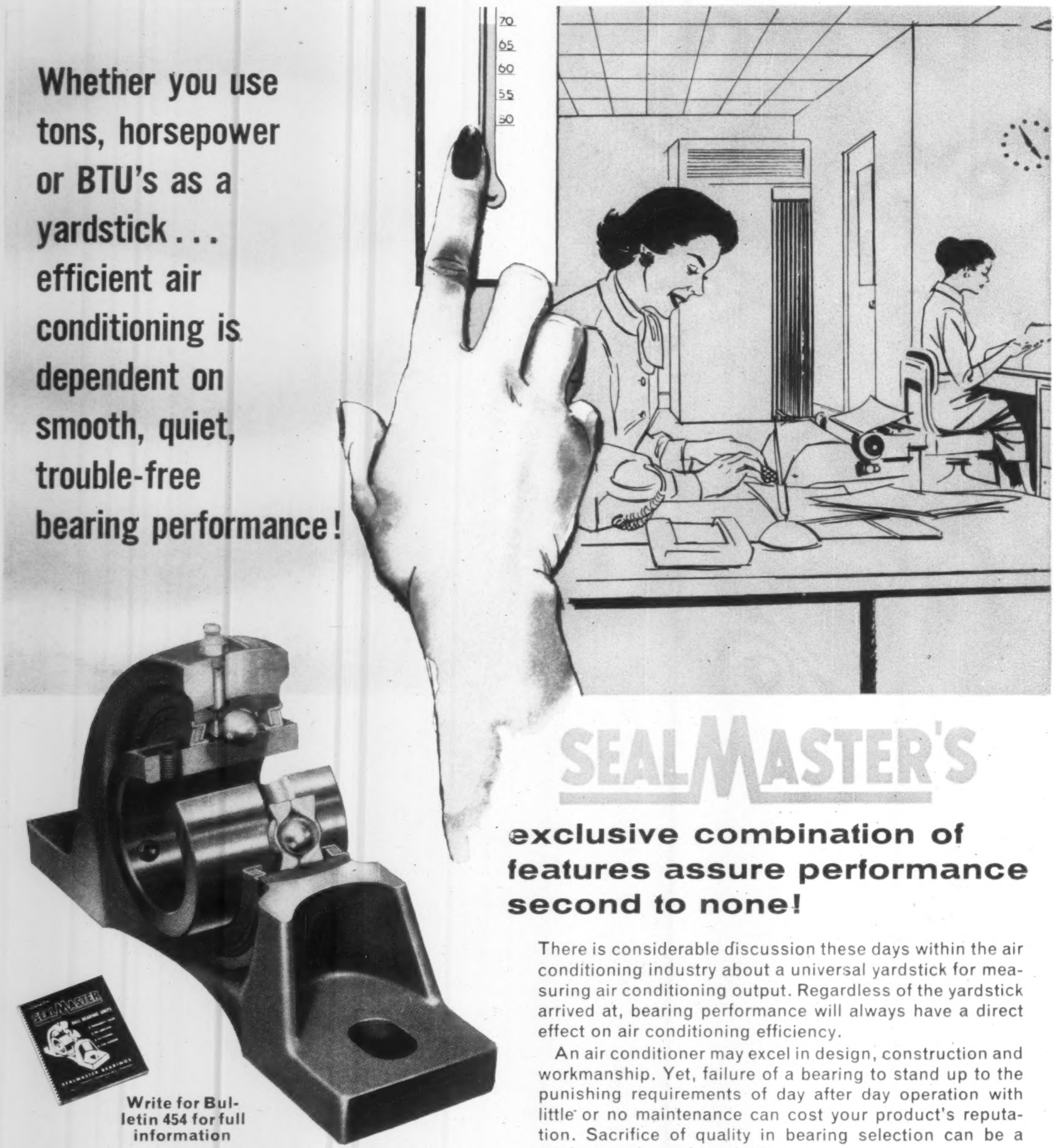
* The extra worth of Superior Steam Generators shows itself when evaluation of equipment, mechanical principles, and heat transfer are made by Consulting Engineers . . . . who have the knowledge and ability to make such evaluation.

for performance you can **BANK** on

SUPERIOR
STEAM GENERATORS

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 36, N.Y.

Whether you use tons, horsepower or BTU's as a yardstick . . . efficient air conditioning is dependent on smooth, quiet, trouble-free bearing performance!



Write for Bulletin 454 for full information

SEALMASTER'S

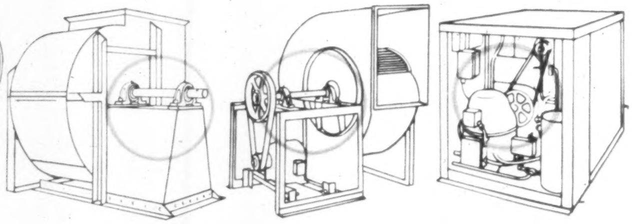
exclusive combination of features assure performance second to none!

There is considerable discussion these days within the air conditioning industry about a universal yardstick for measuring air conditioning output. Regardless of the yardstick arrived at, bearing performance will always have a direct effect on air conditioning efficiency.

An air conditioner may excel in design, construction and workmanship. Yet, failure of a bearing to stand up to the punishing requirements of day after day operation with little or no maintenance can cost your product's reputation. Sacrifice of quality in bearing selection can be a mighty costly market adventure.

SEALMASTER'S exclusive combination of engineering features assure you of the lasting quality you seek. Find out about them today!

SEALMASTER
BALL BEARING UNITS



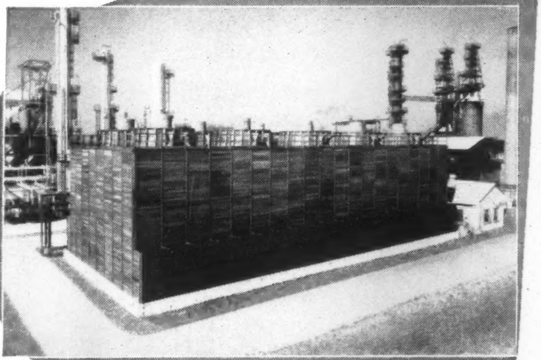
SEALMASTER BEARINGS A DIVISION OF STEPHENS-ADAMSON MFG. CO. 47 RIDGEWAY AVENUE, AURORA, ILL.

PRITCHARD CAN SOLVE YOUR COOLING TOWER PROBLEMS

WITH

Pritchard

HEAVY-DUTY COOLING TOWERS



(COUNTERFLOW)

WITH

Pritchard

LoLine®

COOLING TOWERS

(CROSSFLOW)

What are Pritchard's qualifications for assisting you in selecting the cooling tower best for your specific needs? They are twofold:

1. Pritchard—a founder member of The Cooling Tower Institute—has years of experience in the field of cooling tower application to draw upon—experience in many and varied industries and processes.

2. Pritchard manufactures *both* heavy-duty, counterflow industrial cooling towers and the smaller LoLine crossflow tower for air conditioning or industrial service.

Whichever your need, you can be sure of one thing—you get more from Pritchard! For example, the economical water cooling provided by the Pritchard LoLine; the exclusive, patented POWairSAVER fan on industrial models. If you want guaranteed performance . . . more for your cooling tower dollar . . . consult your nearest Pritchard representative (you'll find him listed in the classified section of your phone book). Or if you prefer, write direct to Pritchard for more information.

SEND FOR TWO FREE BROCHURES

It costs you nothing to get the whole story on Pritchard cooling towers. Just a note to us on your company letterhead is all it takes to get your free copies of the new, LoLine Brochure (gives you all the details and data on Pritchard's low silhouette, crossflow towers) and "The Answers to 15 Questions About Pritchard Industrial Towers" (the inside story of Pritchard Counterflow towers). You are under no obligation, of course, so write today!

INDUSTRY'S PARTNER FOR PROGRESS

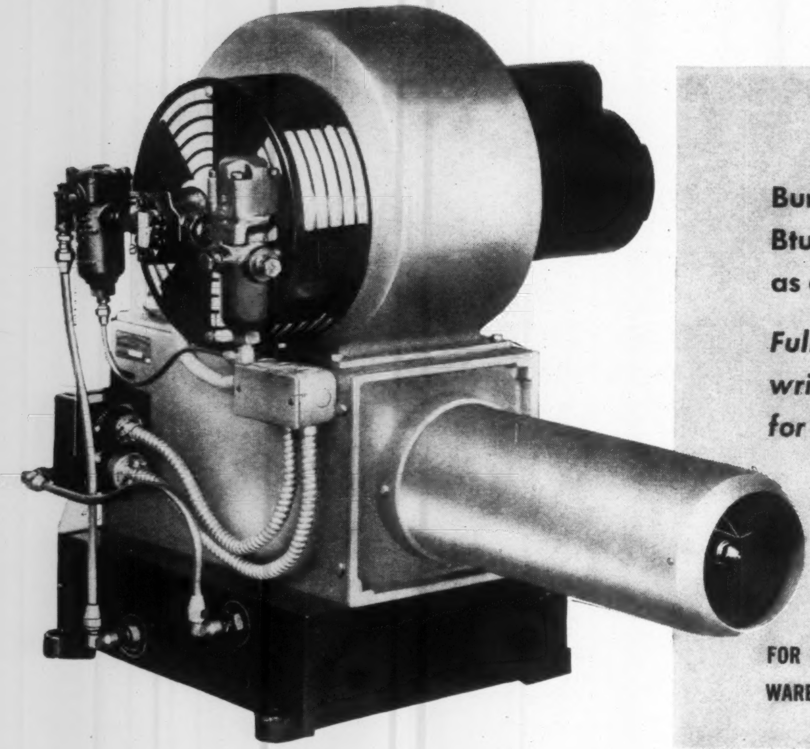
COOLING TOWERS
GAS & AIR TREATING EQUIPMENT

REPRESENTATIVES
IN PRINCIPAL CITIES
FROM COAST
TO COAST

J.F. Pritchard & Co.
OF CALIFORNIA
A DIVISION OF J. F. PRITCHARD & CO
Dept 587 4625 Roanoke Parkway, Kansas City 12, Mo.

HOTTEST SELLER FOR THE COMMERCIAL MARKET

SUN-RAY
#5
OIL BURNER



Burns LOW COST, higher Btu #5 (and #4) fuel oil as efficiently as #2 oil.

Fully approved by Underwriters' Laboratories, Inc., for #5 oil.

CUTS FUEL BILLS

FOR FACTORIES, SCHOOLS, CHURCHES, WAREHOUSES, APARTMENT BLDGS., etc.

Read What Installers Say

OPERATORS HEAT, INC.
Baltimore, Md.

"I want to tell you about the field tests we have run on your #4 Oil Burner over the last fifteen months.

"Several things have stood out:

1. The Boilers have stayed much cleaner.
2. The Burners have been considerably quieter than the ones they replaced, whether light or heavy oil burners.
3. We noticed no difference in burning #4 and #5 oil except a little more pressure was used.

"Our service people and our customers are very happy about the operation of your heavy oil equipment."

Hollis Albert, President

NASSAU MUTUAL FUEL CO.
Hempstead, N. Y.

"Until approximately a year ago we installed nothing but rotary type #5 oil burners. Then, because it was impossible to install one in a particular job, we used our first Sun-Ray #5 Oil Burner.

"May I take this opportunity to thank you for putting out such a wonderful piece of equipment. Not only is it more economical and easier to install, but its efficiency, quietness and trouble-free service are beyond reproach.

"You can be sure we have installed Sun-Ray Burners since, and will continue to do so."

E. A. Werner, Jr., Vice-President

OIL BURNER UTILITY CO.
Woodside, N. Y.

"I would like to take this opportunity to compliment your company on your oil burner.

"Never having used any 4 or 5 oil equipment before, due to the service and installation problems of other units, I forfeited those sales in the past, until I tried one of your burners in July of 1956.

"Having found that the installation and service of your unit is comparable to a #2 oil burner, we began a campaign for this type of work. To date this has proved very profitable for us, with a nice increase in sales, oil gallonage and satisfied customers. We are frankly amazed at how little service these burners require and how well they work."

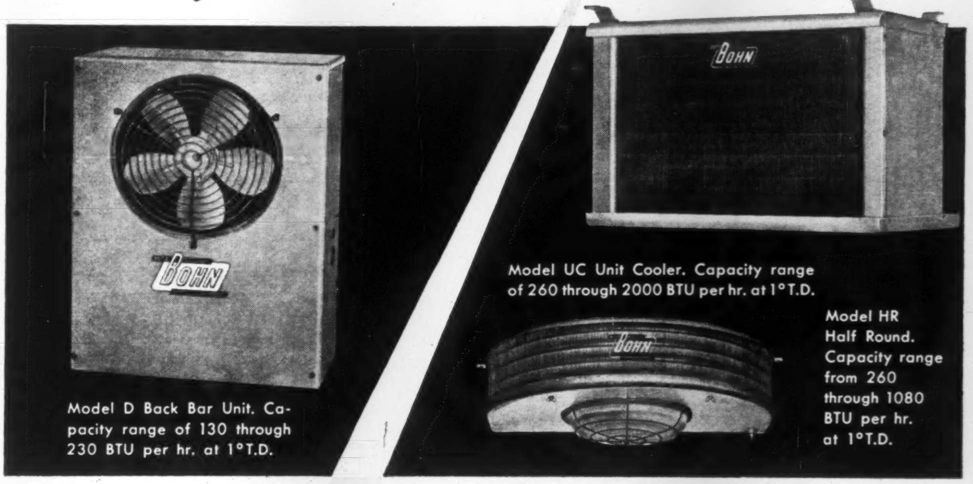
Max Hachmann

Get the facts on why it will pay you to specify and use #5 Burners.

SUN-RAY BURNER MANUFACTURING CORPORATION

139-34 Queens Boulevard, Jamaica 35, New York

BOHN Products



Model D Back Bar Unit. Capacity range of 130 through 230 BTU per hr. at 1°T.D.

Model UC Unit Cooler. Capacity range of 260 through 2000 BTU per hr. at 1°T.D.

Model HR Half Round. Capacity range from 260 through 1080 BTU per hr. at 1°T.D.

for Commercial Refrigeration

rugged • lightweight • grained aluminum cabinets

- No Scratch
- No Rust
- No Paint

Better refrigeration equipment than ever before . . . at low cost . . . backed by BOHN quality and service.

Outstanding features include grained aluminum cabinets . . . rust proof fittings . . . full collar aluminum fins and copper tubing . . . reliable BOHN capacity ratings . . . life lubricated motors.

The new Model D is the ideal universal unit for all types and sizes of back bars. Model UC features built-in liquid distributor and patented air direction louvres. Model HR features a quick cleaning filter, a double drip hinged pan which prevents sweating, and air direction louvres formed in the fins.

Be sure of fine construction and economy. Write today for complete details on these and other models.

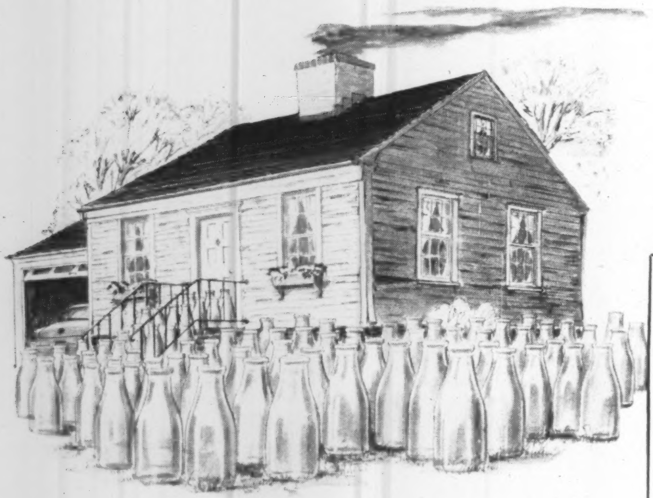
BETZ DIVISION
BOHN
DANVILLE, ILLINOIS

Manufacturers of Commercial Refrigeration, Industrial Air Conditioning and Special Heat Transfer Surfaces

BOHN ALUMINUM & BRASS CORPORATION • BETZ DIVISION • DANVILLE, ILLINOIS

76 Quarts of Actual Water

Permeate the Average Home EACH WEEK...



.. in the form of 152 lbs. of
WATER VAPOR

Here's the breakdown for a family of 4 per week

	VAPOR
Breathing and Perspiring (2 oz. per person per hr.)	51.0 lbs.
Showers (½ lb. per bath)	14.0 lbs.
Washing Clothes	4.3 lbs.
Drying Clothes Indoors	26.0 lbs.
Cooking (Gas) (4.7 lbs. daily)	32.9 lbs.
Ordinary Dish Washing (1 lb. daily, automatic much more)	6.0 lbs.
Mopping (100 sq. ft. daily, 3 lbs.)	18.0 lbs.
TOTAL WEEKLY VAPOR	152.2 lbs. or 76 quarts

In addition, each 1,000 sq. ft. of soil under a building may produce 96 lbs. of water vapor DAILY.

NO WONDER TIMBER ROTS — PAINT PEELS — PLASTER CRUMBLES — STEEL BEAMS RUST!

Because vapor has slight density, about 1/205,000th the density of water at 32°F and 1 millionth at zero degree F., it passes through brick, stone, plaster, etc. Most building materials, even asphalt paper, are *porous* to vapor.

When vapor meets a cold front inside walls and ceilings and reaches a dew-point, it condenses. This destructive "fall-out" (condensation), stimulates the growth of the ever-present microscopic spores of fungi in timber that cause dry-rot. Paint peels! Plaster cracks! Masonry crumbles! Iron rusts! Destructive condensation cost over a MILLION DOLLARS in repair bills to one apartment development alone!

Metals are the best vapor barriers because they have almost ZERO vapor permeability. Multiple layers of aluminum interspersed with air spaces, also scientifically minimize condensation formation on or within them; as well as the flow of heat by radiation, convection, and conduction.

When multiple sheets of aluminum stretch parallel all the way from joist to joist, they insulate the entire area with full-depth, *uniform* protection.

Such insulation is available commercially in *continuous* pre-fabricated lengths of 375 to 750 ft. It is installed in ceilings, walls, floors and crawl spaces; between wood beams and studs, steel girders and trusses.

The U. S. National Bureau of Standards has published an informative booklet describing the destruction that condensation can cause, and means of its prevention. It is entitled "Moisture Condensation in Building Walls". Send us the coupon for a FREE copy.

THERMAL VALUES
Infra Type 4 Parallel Insulation

Up-Heat C .105*=3⅛" non-metallic insulation†
Wall-Heat C .068*=4¾" non-metallic insulation†
Down-Heat C .042*=7⅞" non-metallic insulation†

Cost installed between wood joists, material and labor, about 8¢ sq. ft.

Type 6 also available

Can be purchased everywhere through your preferred local dealer.

*Determined by method of National Bureau of Standards in H.H.F.A. Resea[illegible]Paper 32.
†Calculated on basis of li[illegible]g thermal values cited in Fed. Specs. LLL-f-321b; H[illegible]-585; HH-I-521c; HH-I-551a.

Infra Insulation, Inc., 525 Bway., N. Y. C. Dept. H-10
Send "Moisture Condensation in Building Walls."

NAME____________________

FIRM____________________

KIND OF BUSINESS____________________

ADDRESS____________________

The Editors' Pages

KEEPING PACE with the techniques of new pipe fitting applications requires increasing skill and knowledge on the part of journeymen and apprentice pipe fitters. This demand is being met by the UA through its annual apprentice contest and instructors training course. The fourth such contest was held in August and is reported on p. 102. Sam Lewis' comments on the session appear on p. 105. Instructors courses on plastic pipe and glass pipe are outlined on p. 106 and p. 108, respectively.

August Building Soars To All-Time Record High

. . . weathers cement shortage

AUGUST NEW construction rose to an all-time high of $4.6 billion, according to preliminary estimates of the U.S. Depts. of Commerce and Labor.

This 4 percent gain during August was more than usual for this time of year, in contrast to the less than seasonal rise in July attributed to cement shortages due to work stoppages.

For the first eight months of this year construction expenditures totaled a record $30.5 billion, 2 percent above last year's figure for the corresponding period. On a seasonally adjusted basis, outlays thus far in 1957 were at an annual rate of $46.8 billion, compared with actual expenditures of $46.1 billion for 1956.

A main area of strength in construction activity this year is increased spending for virtually all types of public work. Public outlays for new construction during January-August, led by public schools and highways, amounted to $9 billion, 10 percent above last year's volume for the same months, and an all-time high for the period.

Public residential building, although a small category, also has advanced significantly this year.

Total private construction activity this year, at $21.5 billion, just about equalled the 1956 record for the first eight months. However, new private nonresidential building construction showed a 5 percent gain over the same period of 1956 with record highs set by office buildings, hospitals, and churches.

Contracts for future construction in July totalled $2,900,681,000, a decline of 4 percent below July 1956, according to F. W. Dodge Corp.

Nonresidential contracts in July mounted to $960,658,000, down 11 percent from last year. Nearly all major nonresidential building types shared in the decline.

Residential building contracts were valued at $1,286,937,000, up 13 percent over last July. Contracts for multi-unit dwellings accounted for the major part of the increase in both dollar and unit volume.

Heavy engineering construction totalled $563,086,000, a decrease of 18 percent. Both public works and utilities were below their corresponding year-earlier levels. ∓

Standardize Ratings For Air Moving Equipment

. . . via testing program

AN INTERNATIONAL program, soon to be announced by the Air Moving and Conditioning Association, will provide a means of identifying name brands of air moving equipment which performs according to the manufacturers' stated ratings.

The program has been developed to protect specifiers and users of centrifugal, axial, and propeller fans and power roof ventilators against incorrectly or improperly rated equipment.

This is the first time, states AMCA, that business, industry, and the public has been offered such assurance that air moving equipment will perform as the manufacturer claims.

The association anticipates that most leading U. S. and Canadian manufacturers of such air moving devices will take part in the program. Each qualifying company will be required to sign a license agreement with AMCA to maintain manufacturing control so that each unit of the same size and type will have identical performance ratings.

All product testing necessary for qualification under the AMCA program must be conducted in test laboratories inspected and approved by the association. All published performance ratings must be the results of such tests and/or calculations permitted by the AMCA Standard Test Code.

Full details of the program, including approved test laboratories and names of participating manufacturers, will be made public the first of the year. ∓

Complete Air Conditioning Of Chicago's Conrad Hilton

. . . world's largest hotel

THE $3 MILLION job of air conditioning the 3000 room Conrad Hilton hotel, Chicago, has been completed.

The last of the 3400 centrally fed units was installed August 9, according to Robert P. Williford of Hilton Hotels Corp. The job was started last November.

Air conditioning of the world's largest hotel required 116,160 ft of copper tubing, 54,815 copper fittings, 15,910 ft of steel pipe, 30,000 ft of special insulation tubing, and 18,200 ft of spiral sheet metal duct.

The Conrad Hilton was headquarters for the last two Chicago meetings of the American Society of Heating and Air-Conditioning Engineers. ǂ

Antismog Research Reveals Auto Exhaust Gas Purifier

. . . tests show 80 percent efficiency

ANTISMOG RESEARCH conducted by the Ford Motor Co. has uncovered a chemical which shows promise as an agent for purifying automotive exhaust gases, the company reports.

The purifier or oxidation catalyst is vanadium pentoxide, a yellow powder which effectively eliminated more than 80 percent of offensive hydrocarbons for 100 hr in laboratory tests with a single cylinder engine, according to Ford.

The duration of the effectiveness is said to equal about 4000 miles of actual driving.

Since it is a uranium byproduct, vanadium pentoxide is in excess supply at a cost which makes its use as part of an exhaust device economically attractive. Therefore, it is conceivable that a reasonably priced device might be designed. ǂ

Proclaim Oct. 6-12 Fire Prevention Week

. . . urge all-out effort

PRESIDENT EISENHOWER has proclaimed the week of October 6-12 as Fire Prevention Week and has called on the National Chamber of Commerce to assist in a national effort to reduce losses of life and property from fire.

Fire losses totaled $77.8 million in July 1957, according to the National Board of Fire Underwriters. This is an increase of 11 percent over June 1957 and 13.2 percent more than June 1956. The six month total for 1957 of $628 million is 7.1 percent more than for the corresponding period in 1956.

The National Chamber has urged all local chambers of commerce to provide community leadership in the observance of Fire Prevention Week and the promotion of an effective fire safety campaign throughout the year. ǂ

U. S. Industrial Activity Speeds Utility Gas Use

. . . three times faster

INDUSTRIAL SALES of the gas utility industry increased in 1956 three times faster than the nation's industrial activity, according to the American Gas Association.

While the industrial activity index was rising 2.9 percent, industrial gas sales climbed 9.4 percent to 38,687 million therms. ǂ

Store Cooling: Employees Happy, Sales Up

. . . through air conditioning

SHARP BUSINESS increases and improved employee morale as the result of air conditioning have been reported by some of the nation's leading department stores, according to Carrier Corp.

A survey made by the company has disclosed that sales and office staff attitudes toward their work remained consistently high through the hottest weather.

Employee turnover has been reduced in several department store chains, since persons who would normally resign during the summer months tended to remain at work in an air conditioned building.

These same stores noted sharp business increases for the summer months and attributed the rising sales curve to the installation of air conditioning. ǂ

Observe ABC Anniversary; Bureau is 42 This Month

. . . audits HPAC's circulation

THIS MONTH HPAC, along with upwards of 3900 other members of the Audit Bureau of Circulations, proudly observes the 42nd anniversary of the founding of the ABC.

Each year this cooperative, nonprofit association performs for HPAC an impartial and accurate audit of its net paid circulation—the basic measure of circulation value.

This audit shows us and our advertisers that HPAC has earned reader acceptance to the extent that the reader is paying his dollars to receive his copy each month.

HPAC with pride displays the ABC symbol—a mark of certified paid circulation. ǂ

To Enforce Central Heating Of New York Tenements

. . . beginning next year

BY NOVEMBER 1, 1958, New York city owners of tenements and converted dwellings having 10 or more apartments must provide centrally supplied heating to these structures, according to the local laws of the City of New York for 1956.

Tenements and converted dwellings with less than 10 units are required to have this provided by November 1, 1959.

Other structures, such as converted single or two family residences or reconverted tenements, must have central heating on their conversion, the laws state. ǂ

"Quote"

"There is nothing as difficult in the world as doing any new thing, I don't care how simple it is."—*Charles F. Kettering, director of research emeritus, General Motors Corp., at the cornerstone laying ceremonies on August 13th for the new Cleveland engineering and scientific center.*

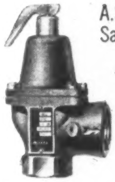
Since 1875

A Great Line Of.. Heating Specialties

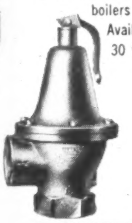
HOT WATER HEATING SPECIALTIES

A.S.M.E. Rated Pressure Safety Relief Valves

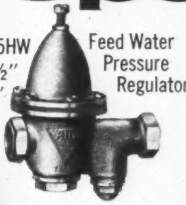
Affords complete pressure protection for hot water boilers with a single valve. Available pressure settings 30 to 150 lbs.



74A Size ¾″



174A Series Sizes ¾″ to 2″ inclusive



135HW Sizes ½″ ¾″, 1″

Feed Water Pressure Regulators

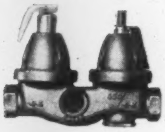
Feeds water to boiler at 10 to 15 lbs.

N56 Size ½″

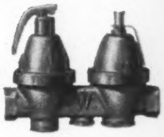
Dual Controls

Feeds water to boiler at 12 lbs. — Pressure relief at 30 lbs.

45A Deluxe construction Size ½″

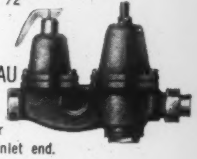


N450 Popular design Size ½″



450

Dual Control with built-in check valve

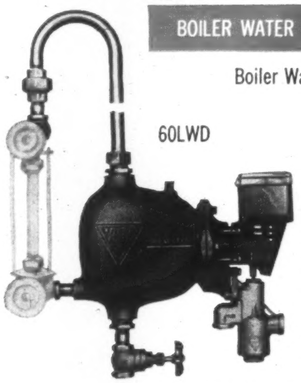


45AU

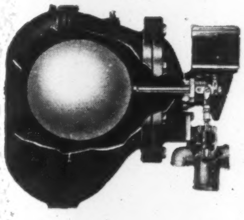
Nos. 45AU or N450U have sweat copper union applied to inlet end.

BOILER WATER LEVEL CONTROLS FOR LOW PRESSURE STEAM HEATING BOILERS

Boiler Water Feeders



60LWD



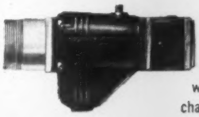
76LWD

Feeder cut-off combinations

SERIES	CONNECTIONS	CAPACITY	STEAM	WATER
60	½″ gauge glass	up to 5,000 sq. ft. rad.	25 lbs.	150 lbs.
76	1″ chamber, ¾″ feed valve	over 5,000 sq. ft. rad.	35 lbs.	150 lbs.
81	1″ chamber, ¾″ feed valve	over 5,000 sq. ft. rad.	35 to 75 lbs.	150 lbs.

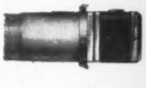
Low Water Cut-Offs

Maximum steam pressure 25 lbs.

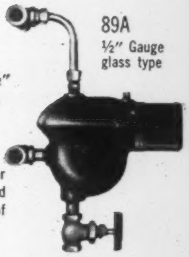


101A

Exclusive 2½″ screw-in type with sediment chamber.

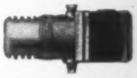


193A 2½″ Screw-in type for use where shallow section and depth of jacket prevent use of No. 93A.



89A

½″ Gauge glass type



93A

2½″ screw-in type

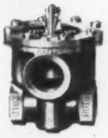
50A

1″ Float chamber connections for use on process boilers and hot water heating boilers. Max. steam press. 50 lbs.

OTHER PROTECTIVE & CONTROL DEVICES

36

Vacuum Relief Valve For use on steam coil heaters to prevent a vacuum. Size ¾″.



71

Tempering Valve for tankless heaters. Sizes ½″, ¾″, 1″.

152

Steam Regulator for process. Sizes ½″, ¾″, 1″.

127

Steam Regulator for process and dead end service. Sizes ½″ to 3″.

WATTS

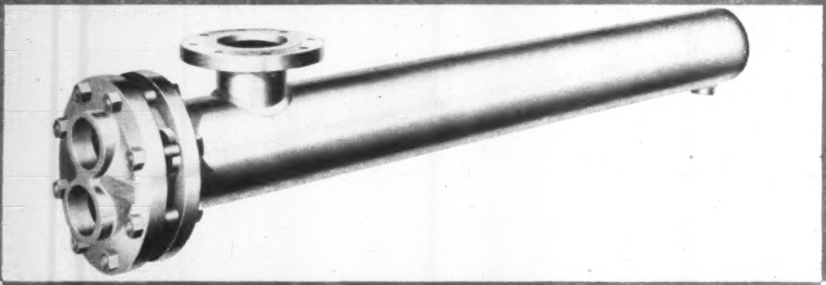
REGULATOR COMPANY

LAWRENCE, MASSACHUSETTS

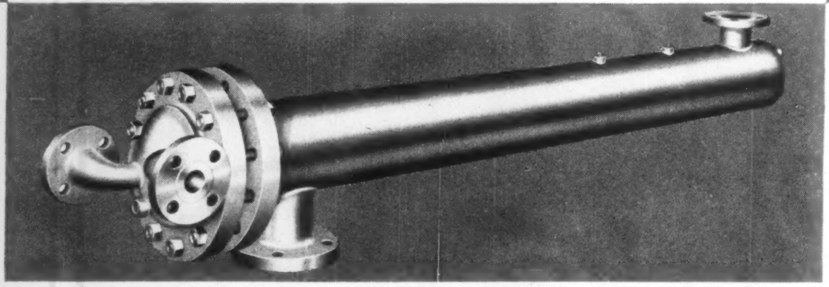
LARGEST AND MOST COMPLETE LINE OF ITS KIND IN THE WORLD

NEW FROM TACO

A STANDARDIZED LINE OF A. S. A. HEAT EXCHANGERS AND HIGH TEMPERATURE–HIGH PRESSURE CONVERTERS



For general applications, specify the Taco "L" or "S" series Heat Exchangers.



For High Temperature-High Pressure, specify the rugged new Taco HT series converters. Working pressures to 400 p.s.i. Operating temperatures to 450°F.

Both new lines of Taco Heat Exchangers are made under strict quality control production to A.S.M.E. code and A.S.A. flange standards.

TACO HEATERS, INCORPORATED

1160 CRANSTON STREET, CRANSTON, RHODE ISLAND

Corporate Office: 342 Madison Avenue., New York 17, New York
In Canada: Taco Heaters of Canada, Ltd., 4 Gilead Place, Toronto 2

CIRCULATOR • 170 PUMP • MP PUMP • FLOCHEK • AIR-SCOOP • TACO-VENT • TEMPERING VALVE • VENTURI

Please send me at no cost your new: H.P.

☐ Heat Exchanger catalog
☐ High Temperature-High Pressure converter catalog
☐ Both

NAME ____________________ TITLE ____________

COMPANY ____________________

ADDRESS ____________________

____

"Open for Discussion"

• *WE FOLLOW HERE each month the practice at engineering society meetings of providing an "open for discussion" period. You are urged to take part. Just address your comments to the Editors, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2.*

Article on Machine Calculation Of Piping Problems Timely

I AM VERY INTERESTED in Dr. John E. Brock's excellent and timely article *How Giant Brains Aid Piping Design*, in the May, June, and July HPAC's. He mentions that the amount of labor involved in solving a flexibility problem increases as the cube of the unknown, i.e.. the number of anchors on restraints. This is not true for the Blaw-Knox—Arthur D. Little, Inc., method due to its basic mathematical approach. In this approach the amount of calculation required to obtain a solution is directly proportional to the number of unknowns. Also, we do not neglect such things as the "pitch" used for drainage, since hand computation of direction cosines is not required. Similarly, skewed bends and bends other than 90 or 45 deg offer no problem.

Incidentally, we are factoring into the program our Datatron machine as stated by Dr. Brock. However, this is not to solve the problem but only to check for consistency the dimensional data taken off the piping drawings. It is considerably more economical to do this checkout on a relatively slow speed machine than on the high speed Univac.

PETER STRONG
Arthur D. Little, Inc.
Cambridge, Mass.

Predicts "Humiture" Will Become Universal Comfort Index

I BELIEVE, as a result of my studies, that eventually we will abolish the "relative humidity" system of computing the amount of moisture in the air, either indoors or outdoors, and that we will use temperature (Fahrenheit) and humiture instead. In place of the relative humidity reading we will have the direct wet bulb reading, which, when opposed to Fahrenheit, will give the true basis for arriving at the humiture index expressed in humits. By taking the "average" of the temperature and wet bulb readings — dividing their sum by two, under the humiture system — you derive a figure that makes sense mathematically and scientifically.

With the advent of the use of this new pattern, I further believe that the "Weather Clock" or "Humiture Clock" — my invention, and now assured a patent — will come into increasing use, until eventually we will tell comfort the way we tell time. I believe that dry bulb and wet bulb temperature and relative humidity can be considered just as much as hours and minutes, and I can envision people saying "70-50-60" when referring to the optimum comfort setting, much as they would say "12-10-50" to indicate it is 10 minutes and 50 seconds past 12 o'clock. I consider that humiture will eventually come into recognition as having the exact relationship to temperature and humidity that seconds have to minutes and hours. The logical way to give the public this simple and easily understood information, so essential to their comfort and well being, is to display the three components on the face of the "Weather Clock." The clock is, of course, operated by conventional elemental coils, responding to changes in temperature and humidity.

My effort is to give the direct reading of the moisture vapor in the air, at any given time, as we give the direct, not relative, reading, at any given time, of temperature.

As already stated, ultimately humiture will be derived from combined readings of Fahrenheit dry bulb and wet bulb, instead of as at present dry bulb and relative humidity.

We thus gain the average of the two indicia, as stated first above, giving the value of the two in equal proportions, resulting in identical weight being allotted to both temperature (Fahrenheit) and moisture vapor, instead of as present, wherein various values are allotted to each, according to the proportion of moisture vapor in the air at any given time.

What I have endeavored to do is to give a popular "direct" reading of atmospheric moisture content at any moment, just as we have for many years secured a direct reading of heat or cold at any moment. Why should people be given a "relative" reading of moisture content in the air, any more than they are given a "relative" reading of heat or cold? Why, then, is it not logical to regard the wet bulb — for which there appears to be no other name or scientific designation — in the same light as the dry bulb, insofar as providing a direct reading at any time? Further, then, does it not follow in logical order, that a joint reading of dry and wet bulb averaged — humiture — furnishes a true index of human comfort, statistically? You have the sum of the direct results of each component.

Whether we continue to combine the dry bulb temperature and relative humidity to supply the humiture reading, or whether we eventually adopt the dry bulb and the wet bulb temperatures to furnish the humiture reading, the word "humiture" as the combined effect of the two well known components is here to stay. Humiture and its unit of measurement, humits, were both alphabetically listed in the Thorndike-Barnhart dictionaries early in 1957. Humiture was already listed in the supplement of Funk & Wagnalls New Practical Standard dictionary. It is listed in other reference works.

Relative humidity will always, of course, have a value in immediate scientific assignments, for instance in manufacturing gunpowder, textiles, or tobacco products. I speak of its relegation only in the "popular" sense and in direct relation to human comfort for the millions for whom the humiture index is an answer, simple (but not oversimplified) and understandable.

Osborn Fort Hevener
Assistant Head
Public Relations Dept.
The First National City Bank
New York, N. Y.

Air Conditioning Power Costs Analyzed for Church Installation

Supplementary to my article 440 *Ton Peak Load Storage System Conditions Church*, in the May 1957 HPAC, the accompanying tabulation of the 1956 operating costs for this system serving the East Dallas Christian church may be of interest.

It should be especially noted that the actual power cost for 1956 was $1390, as compared with the $1305 which I estimated prior to the installation of this system.

Month	Kwh 2, 25hp	Kwh 2, 50hp	Kwh Total	Cost
1956				
Jan.	0	0	0	
Feb.	0	0	0	
March	0	0	0	
April	2,320	4,400	6,720	$56.00
May	5,720	11,280	17,000	142.00
June	12,240	20,960	33,200	279.00
July	11,080	18,880	29,960	251,00
Aug.	10,040	17,280	27,320	229,00
Sept.	12,920	11,320	24,240	203.00
Oct.	11,200	14,400	25,600	215.00
Nov.	600	1,200	1,800	15.00
Dec.	0	0	0	0
			Total cost	$1,390.00

David C. Pfeiffer
Consulting Engineer
Dallas, Texas

Quonset Huts Adequately Heated By Space Heaters; Fans Improve Comfort

We found the article *Reflective Wall Lining Reduces Body Heat Loss in Arctic Structure* by C. P. Yaglou, C. E. Newton, and D. W. Marble in the March HPAC interesting. For the past four winters Quonset huts within this command have been adequately heated by means of oil fired space heaters and circulating fans. Heat is provided by convection type space heaters, and air is circulated by kitchen exhaust fans. Fans are installed at the ceiling level several feet from the space heaters. "Stove pipe" ducts are fastened to the ceiling and terminate in an adjustable 45 deg elbow and cone, the air being directed down toward the doors.

Without air circulation, temperatures of 120 F at the ceiling and 30 F at the floor were common, with outside temperatures in the subzero range. With the circulating fan in operation, the ceiling temperature dropped to 85 to 90 F and floor temperatures went up to 50 to 55 F, with elimination of the cold floor condition.

Constant use of the fan was found to be objectionable due to the noise; however, it was found that starting the fan an hour before the occupants were awakened was sufficient to bring about the temperature condition mentioned above.

Fuel saving was possible due to operating the space heaters with a lower flame after the fans were installed.

Norman H. Ostrin
Mechanical Engineer
Hq, USARAL, Office of the Engr.
APO 949
Seattle, Washington

Engineers, Others Needed As Patent Examiners

The U.S. Patent Office is still desperately in need of engineers and scientists to serve as patent examiners. While delays in the processing of patent applications have been somewhat reduced, it still takes about 10 months before a new patent application is first examined, and about 3½ years before a patent is issued.

Men and women holding college degrees in engineering or applied science, or a degree with a major in chemistry or physics, or with certain combined credits in these fields, are eligible for appointment without examination, upon application to the Commissioner of Patents in Washington, D. C.

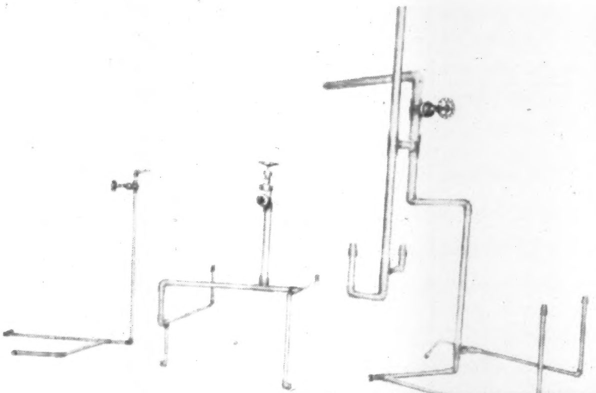
The minimum starting salary is $4480 per year. Promotion to $5335 per year may be expected after three months' service. With as little as six months of professional experience, the starting salary is $5335 per year with an expected increase to $6250 nine months later. It is normal for an examiner to be earning $8215 in less than five years after graduation from college, with additional opportunities for promotion up to $13,760.

Henry E. Sharpe
Vice Chairman
New York Patent Law Association
New York, N. Y.

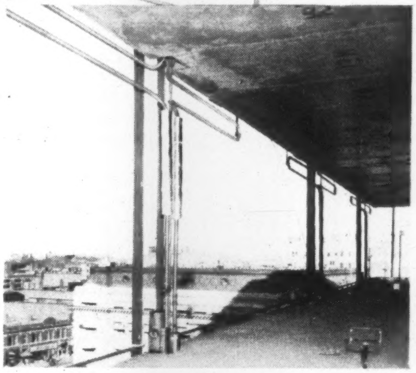
Church Heating System Designed by John D. Dillon

The heating system discussed in the article *Tile Blocks Radiate Heat Through Floors as Warm Air Passes Through Blocks*, in the September HPAC, was designed by John D. Dillon, consulting engineer. The architect for the new Fairmount Temple in Beechwood Village, Cleveland, was Percival Goodman.—Ed. ✠

Ease of Prefabricating
REVERE COPPER WATER TUBE
a big factor in proving copper costs less than rustable material to install



REVERE COPPER WATER TUBE lends itself ideally to sub-assemblies like these. Except for the vent stack the three sub-assemblies shown make up the complete roughing-in for an entire bathroom. Solder fittings assured tight joints when handled and installed. Installation time was saved. Tube supplied by Revere Distributor, CRANE COMPANY, Dallas, Texas.



CHILLED WATER CIRCULATING SYSTEM of Revere Copper Water Tube showing expansion loops and risers which are carried out through the entire periphery of the building. All tube will eventually be insulated as shown. Note absence of joints when easy-to-bend Revere Copper Water Tube is used. It would have been necessary to cut 8 threads and make 8 fittings, in this one set of loops alone, had rustable pipe been used here.

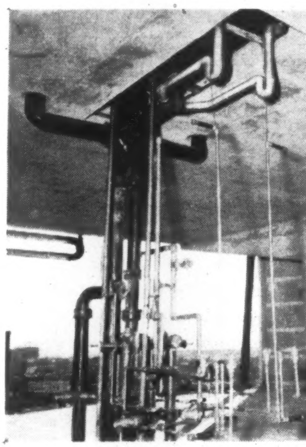


PHOTO SHOWS a complete roughing-in of two abutting baths, together with copper drainage lines from the two bathtubs in the bathroom above. Easier fabrication, less space requirements and the non-rusting qualities of copper are the reasons for using this material for these drainage lines on this job.

THE STATLER HILTON HOTEL
Dallas, Texas

In this newest Dallas hotel there were 60,000 lbs. of Revere Copper Water Tube in diameters ranging from ⅜″ to 2½″ used for hot and cold water plumbing lines and chilled water lines for air conditioning.

A most interesting feature of this installation was the various sub-assemblies used. (See upper left photo) According to Mr. Brown of the BROWN-OLDS COMPANY, mechanical contractors on the job, "The prefabrication of the sub-assemblies saved many hours of installation time, thus making a copper job cost less than rustable materials to install. But that's only *one* reason we prefer copper water tube. Not only is time saved with the solder fittings used, but you can work in the tight spots without worrying about wrench space. You are always sure of tight joints, and sub-assemblies can't work loose in handling. Then, of course, there is never any corrosion problem, so we always feel confident of doing a good job when we use copper water tube."

These same outstanding characteristics of Revere Copper Water Tube also make it the preferred material for radiant panel heating, underground service lines, drainage, waste and vent lines, oil burner and processing lines.

REVERE COPPER AND BRASS INCORPORATED
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Question of the Month

How Can Makeup Air Be Heated?

This question was asked previously in HPAC and is repeated here along with answers that have been received from readers. E.J.M.'s plant has two exhaust systems for waste gases and he wants to use them to heat makeup air. One reader gives two ways to do this, says recirculated water is best. Another says use of hot water would cost too much. Other answers or comments for publication are invited.

"An industrial plant has two exhaust systems, of 12,000 cfm and 30,000 cfm capacity, respectively. As these systems serve two separate areas, makeup air must be introduced into each area.

"This makeup air is to be heated to a minimum temperature of 65 F from the outdoor design temperature of −10 F.

"The 12,000 cfm of makeup air is to be heated from the 600 F waste gases from a gas heat treating oven in that area.

"The 30,000 cfm of makeup air is to be heated from the 300 F waste gases from a gas heat treating oven in that area.

"We are anxious to select the proper heat transfer equipment to heat this makeup air. We would like to use hot water as an indirect means, but we will appreciate any suggestions from other readers."—E.J.M.

Waste Gases, Recirculated Water Are Two Ways; Latter Seen Best

A QUANTITATIVE answer to the question cannot be given since the amounts of 600 F and 300 F waste gases are unknown. However, qualitative solutions are possible.

The first solution is to have the two masses of makeup air preheated to a minimum of 35 F by using the waste gases. This can be done by installing fin type heat exchangers which are designed for gas-to-gas applications. The air can then be reheated to 65 F by conventional hot water heating coils. Control of the final temperature of the makeup air can be obtained by varying the temperature of the hot water entering the reheat coils.

The second and better solution, in my opinion, is to use recirculated water as the indirect heating medium. The water can be heated by the waste gases in helical finned coils. It is then circulated through conventional hot water coils where the makeup air is heated to 65 F and back to the helical finned coils.

If the heat from the waste gases is insufficient, the water can be passed through a shell-and-tube type heat exchanger where it can be brought up to the required temperature. Control of the final temperature of the makeup air can be obtained by using a mixing valve to vary the temperature of the hot water entering the heating coil.

SOL SCHWARTZ
Professional Engineer
Bellmore, N.Y.

Investment, Operating Costs Dictate Use of Direct Gas-to-Air Exchanger

USE OF hot water for this application is not recommended. The additional required equipment such as pumps, tanks, piping, controls, and instruments would add too much to the investment to make its use practical. Also, operating costs would be increased due to the pump power required for water circulation and the additional maintenance expense resulting from the use of more equipment.

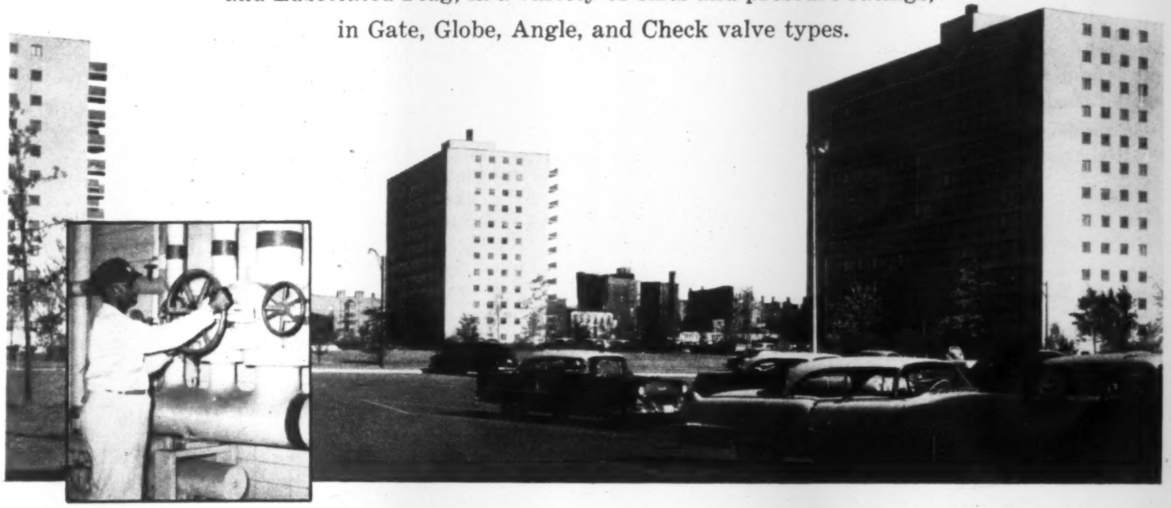
Minimum gas temperature leaving the exchangers is dictated by dew point characteristics and exchanger surface area costs. If the gases contain corrosive elements such as sulfur, vanadium, etc., the leaving temperature will be influenced by their presence. A gas analysis should be made to properly establish temperature limits. Use of alloy steels, ceramics, or other special materials may be needed to counter this prob-

(Continued on page 88)

Carefully selected Walworth valves and fittings serve ultra-modern

Lake Meadows development

Chicago's new 100-acre development, to house about 2000 families, makes the facilities of its streamlined shopping center available to additional thousands in the surrounding area. Quality is the keynote throughout the construction of Lake Meadows and literally hundreds of Walworth Valves and Fittings have been specified and installed in the vital plumbing, heating, ventilating and air conditioning systems. Valve requirements have been so broad that almost all of Walworth's complete lines are represented—Steel, Iron, Bronze and Lubricated Plug, in a variety of sizes and pressure ratings, in Gate, Globe, Angle, and Check valve types.



Cabie Maxwell, Stationary Engineer, operating a Walworth Iron Gate Valve on main steam lines to various buildings at Lake Meadows.

OWNER: New York Life Insurance Company
ARCHITECT: Skidmore, Ownings & Merrill
BUILDER: Turner Construction Company
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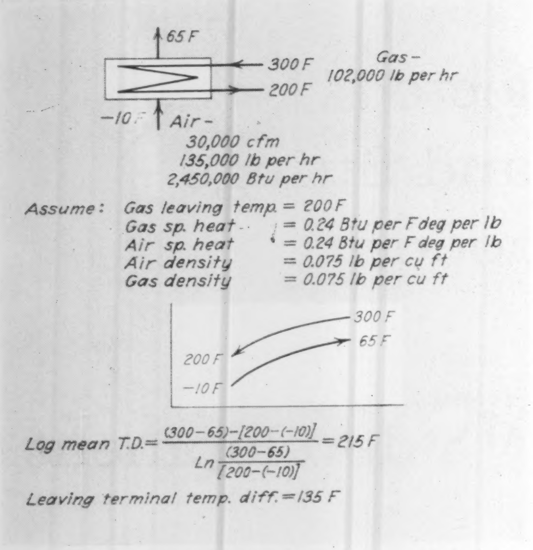
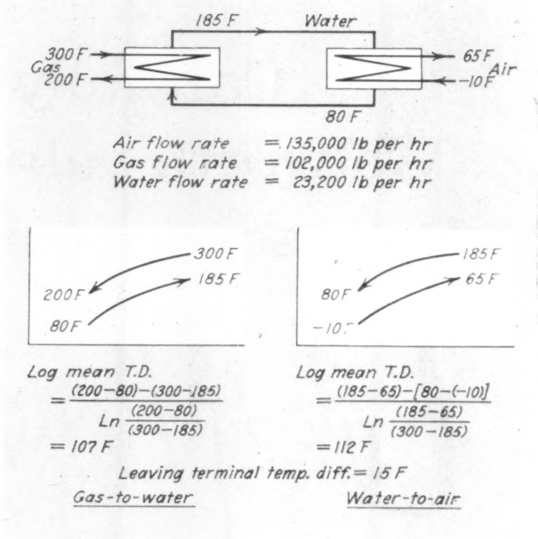

65 F
300 F
200 F
Gas – 102,000 lb per hr
–10 F
Air – 30,000 cfm
135,000 lb per hr
2,450,000 Btu per hr
Assume: Gas leaving temp. = 200 F
Gas sp. heat = 0.24 Btu per F deg per lb
Air sp. heat = 0.24 Btu per F deg per lb
Air density = 0.075 lb per cu ft
Gas density = 0.075 lb per cu ft
300 F
65 F
200 F
–10 F
Log mean T.D. = (300–65)–[200–(–10)] / Ln (300–65)/[200–(–10)] = 215 F
Leaving terminal temp. diff. = 135 F

1 GAS-TO-AIR EXCHANGER provides maximum heat recovery with minimum surface area — in this case, only one-quarter the surface required by an arrangement using water


185 F
Water
300 F
Gas
200 F
65 F
Air
–10 F
80 F
Air flow rate = 135,000 lb per hr
Gas flow rate = 102,000 lb per hr
Water flow rate = 23,200 lb per hr
300 F
185 F
200 F
80 F
185 F
65 F
80 F
–10 F
Log mean T.D. = (200–80)–(300–185) / Ln (200–80)/(300–185) = 107 F
Log mean T.D. = (185–65)–[80–(–10)] / Ln (185–65)/(300–185) = 112 F
Leaving terminal temp. diff. = 15 F
Gas-to-water
Water-to-air

2 COMPARABLE RELATIONS for system using hot water as indirect means of heat transfer prove this arrangement not so efficient. Gas-to-water-to-air may be more expensive, too

lem. This is of particular importance if fuels other than gas are to be used in the future. Exchanger surface geometry and size of heat transfer elements will also be influenced by these properties.

E.J.M. gives us the exhaust air quantities and gas temperatures, but does not mention gas quantities. Since closed heaters have inlet and outlet terminal-temperature differences, use of water in addition to the gas and air streams will increase the number of required heat exchangers with increased irreversibility of the process. This thermodynamic cycle will reduce the efficiency by utilizing less of the available heat energy.

Fig. 1 is a diagram for a gas-to-air exchanger using assumed thermal data for the 30,000 cfm installation.

Fig. 2 shows comparable relations for an arrangement employing water as an indirect means of heating.

Since required surface area varies inversely with the logarithmic mean temperature difference, it may be seen that the gas-to-air cycle offers maximum heat recovery with minimum surface area. The example in Fig. 1 requires only about one-fourth the surface as needed for the gas-to-water-to-air arrangement. Similar relations may be applied to the 12,000 cfm exhaust system.

Since the cost of heat exchangers increases exponentially with surface area, there is an optimum size for a given installation. It is recommended that gas-to-air heaters be installed which will limit the number of fluids to two and thereby minimize investment and operating costs.

H. B. Wayne
Consulting Engineer
Woodhaven, N.Y.

READER ASKS —

"What's Best Method for Cleaning Air Conditioning Condensers?"

"I would like to know what is the best method for cleaning air conditioning condensers.

"In cases where water sludge, algae, slime, and other compounds are present in the condensers and connected piping we have been using carbon tetrachloride to clean the system. The chemical solution is admitted into the piping and condenser and is permitted to remain in the system for 2 or 3 hr. Then we blow it out with air or dry nitrogen. Following this, the system is dehydrated with a vacuum pump.

"This is a tedious process and surely there must be a faster and more efficient way.

"I also want to know what methods are practical for removing scale and corrosion from these parts of an air conditioning system. We are treating the water so that the pH value ranges from 5 to 7, but we still find some lime scale developing.

"I would appreciate hearing how other HPAC readers clean this sludge, scale, slime, and other compounds that inevitably seem to develop in piping and condensers."—W.S.P.

• *YOU ARE INVITED to contribute a question for publication or an answer to a published question. Write: The Editors, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2.*

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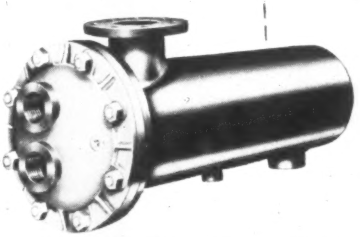

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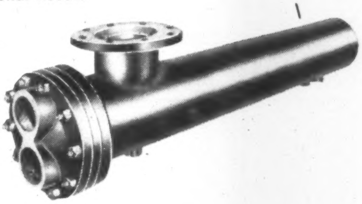
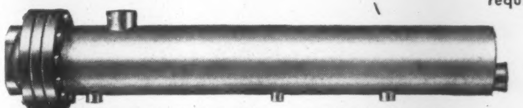
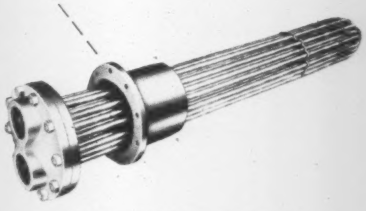


CONVERTERS 54 sizes steam-to-water. 20 sizes water-to-water (baffle type). Capacities to 900 g.p.m.



FUEL OIL HEATERS 5 types. Oil-through-shell or oil-through-tubes, for use with steam or boiler water — discharge or suction side of oil pump — U-tube or straight tube.



TANK-HEATING UNITS 54 sizes for all requirements.

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TANKLESS AND INSTANTANEOUS WATER HEATERS AND HEAT EXCHANGERS

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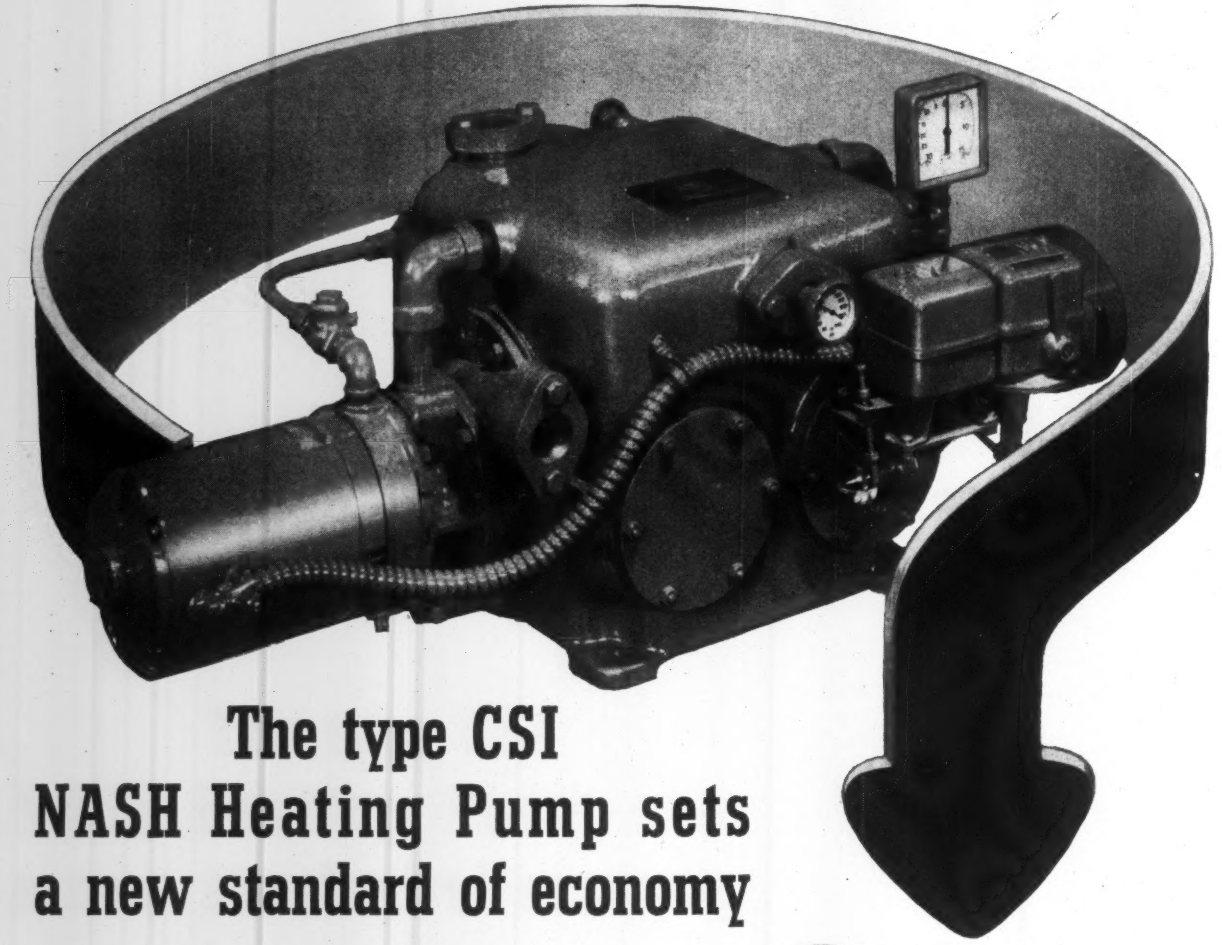

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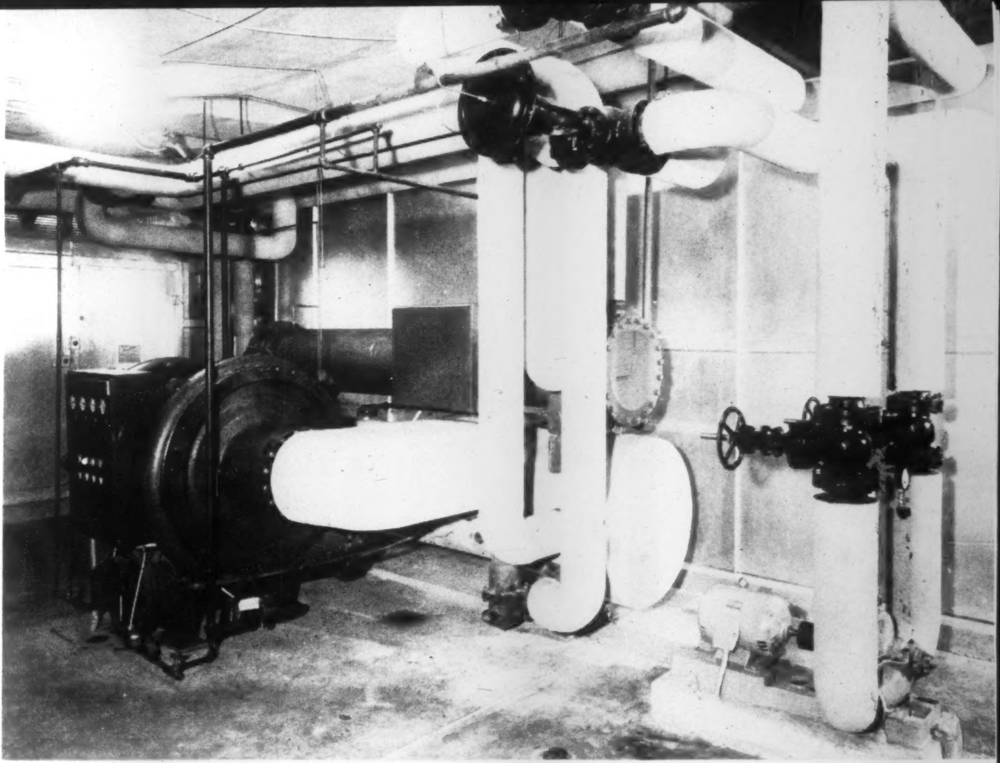


CENTRIFUGAL COMPRESSOR, capable of operating with variable output and proportional power requirements, serves as heat pumping unit

Well Water Proves Good Supply Source For Heat Pump Installation

. . . in new telephone building

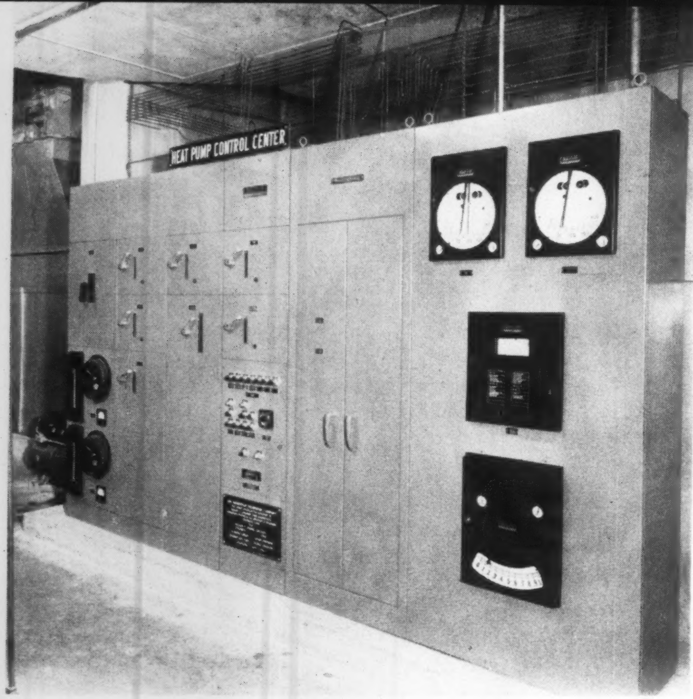
Design conditions for 50 ton system included:

- **balanced heating, cooling loads**
- **operating flexibility**
- **simplicity of control**
- **economy**

BY R. J. KRAMER
Ralph J. Kramer, Comer, and Passe
Consulting Engineers

A HEAT PUMP SYSTEM using well water as the source air conditions the new commercial building of The Mansfield Telephone Co., Mansfield, Ohio, year 'round. Chief among the factors which influenced the selection was the fact that the heating and cooling loads balanced each other.

Before the design of the system was started, an investigation was made to determine the exact underground water conditions. Generally



CONTROLS, INSTRUMENTS are located in free standing, enclosed, multi-unit control center opposite the compressor unit

where ground water conditions are favorable, that is, where water is noncorrosive, nonscaling, and is available in required quantities, the well water source system is preferred because of its advantageous performance factor.

A supply and a waste well, each 12 in. in diameter, were made in yellow and gray sandrock, and each produced clear, fresh water at 52 F. The supply well has a depth below grade of 250 ft and the waste well a depth of 300 ft.

During the course of the 24 hr pumping tests, the supply well produced at the rate of 300 gpm over a 12 hr period and the waste well at the rate of 500 gpm over an 8 hr period. The maximum pumping rate possible from either the supply or waste well was considerably in excess of the well water requirements of the system.

A design of a well water source heat pump system was then begun. The general procedure which was followed was similar to that used for the design of conventional summer-winter air conditioning systems. The primary difference in procedure was in the method used for the selection of outdoor design conditions and in the selection of equipment.

Select Design Conditions

For the selection of design conditions the U. S. Dept. of Commerce climatological data publications for the area were studied for representative years. An outside heating design dry bulb temperature was selected that represented a value below which the outside air temperature never remained for a period greater than approximately 6 hr. When the outdoor design conditions are exceeded, the thermal storage capacity of the structure will assist in maintaining comfortable temperatures within the building. When design conditions and consequent loads are correctly determined, it is possible to select the system and equipment most suitable to anticipated conditions. An overdesigned system will cost more to install, will occupy more building volume, and will cost more to operate.

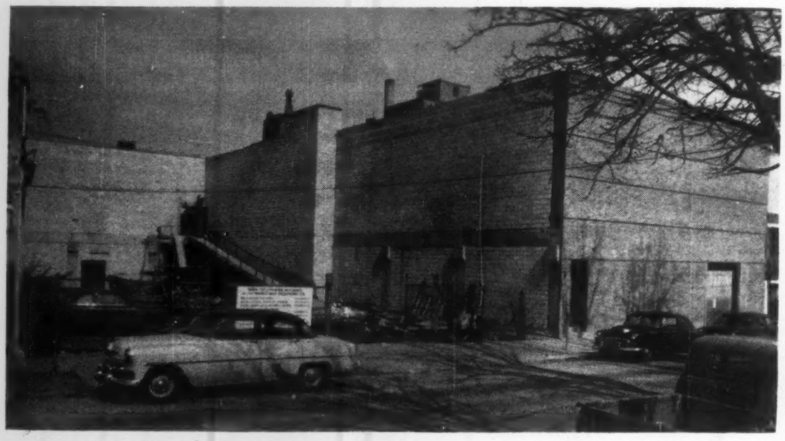
The selection of design conditions and loads is the most important phase of the heat pump design. The design conditions and loads for the building were as follows:

Cooling Load

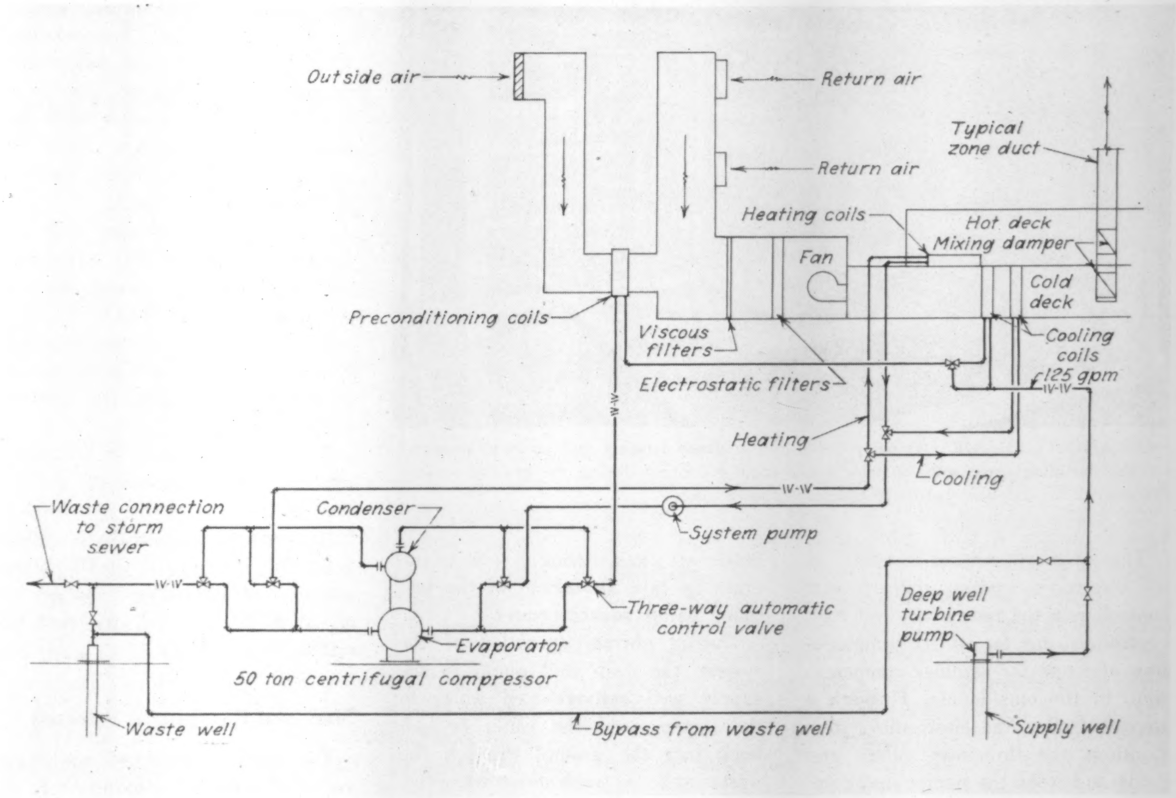
Outside air DB temperature, F	95
Outside air WB temperature, F	76
Inside air DB temperature, F	80
Inside air WB temperature, F	65
Building sensible heat gain, 1000 Btu per hr	1112.5
Building latent heat gain, 1000 Btu per hr	136.3
Ventilation sensible heat gain, 1000 Btu per hr	91.0
Ventilation latent heat gain, 1000 Btu per hr	100.0
Total sensible heat gain, 1000 Btu per hr	1203.5
Total latent heat gain, 1000 Btu per hr	236.3
Grand total heat gain, 1000 Btu per hr	1439.8

Heating Load

Outside air temperature, F	0
Inside air temperature, F	75
Conduction heat loss, 1000 Btu per hr	745
Ventilation heat loss, 1000 Btu per hr	455
Total heat loss, 1000 Btu per hr	1200



BALANCED HEATING, COOLING loads in telephone building are aided by largely windowless design of structure


Outside air
Return air
Return air
Typical zone duct
Heating coils
Hot deck
Mixing damper
Fan
Cold deck
Preconditioning coils
Viscous filters
Cooling coils
125 gpm
Electrostatic filters
Heating
Cooling
Waste connection to storm sewer
Condenser
System pump
Three-way automatic control valve
Deep well turbine pump
Evaporator
50 ton centrifugal compressor
Waste well
Bypass from waste well
Supply well

WELL WATER SOURCE HEAT PUMP SYSTEM consists of the centrifugal compressor, the automatic valves and piping which alter the water circuits of the evaporator and condenser, pumps, heating and cooling coils, fans, filters, and ductwork

After the selection of design conditions, the problem of design was that of selecting and assembling equipment that would operate at maximum efficiency at or near the point of average load and that would also be capable of satisfactory performance at the points of design load. There are normally two ways this can be accomplished:

1) Provide a multiple number of refrigeration units and well pumps that can be operated in stages.

2) Provide equipment whose output can be modulated to the varying load requirements.

The solution that was compatible with initial cost and simplicity of control dictated a single well pump and a compressor capable of operating with variable output and proportional power requirements. A centrifugal compressor with the required features was decided upon as the heat pumping unit. The various possibilities of water circuits were studied and those indicated in the above diagram were selected.

The main air conditioning system is of the central, dual duct type. This type of system permits simultaneous heating and cooling. This is essential for proper performance since some interior zones will require cooling during the heating season.

Each zone thermostat, acting through pneumatic motor operated dampers, causes air to be mixed at the central equipment room to control the temperature in the respective zone.

At the main equipment room, return air is mixed with preconditioned outside air, and the resulting mixture is then passed through a viscous type filter system and an electrostatic air cleaner.

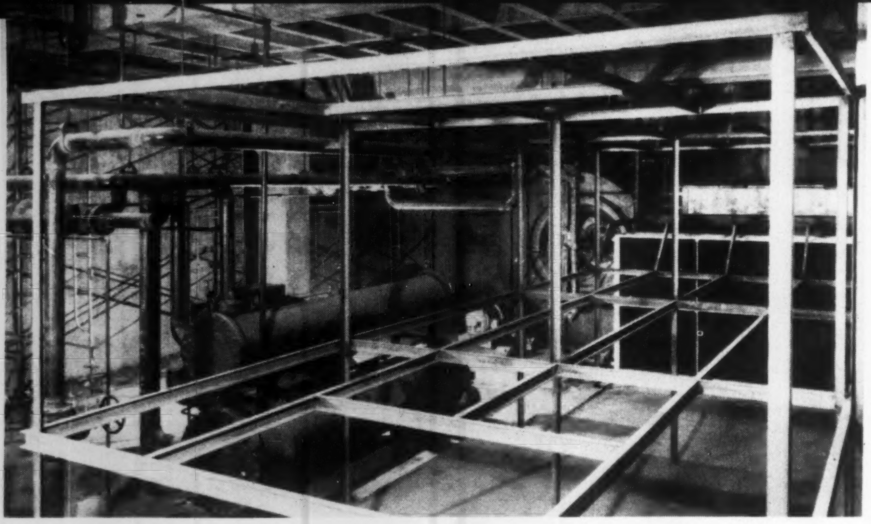
A differential static pressure regulator and variable speed drive are used to regulate fan speed to obtain constant differential static conditions in the main ducts regardless of the air path through the air conditioning equipment.

How Heat Pump Cycle Operates

The heat pump system itself consists of the centrifugal compressor unit and the automatic valves and piping which alter the water circuits of the evaporator and condenser.

Upon a demand for heating, well water goes through the evaporator, at an entering water temperature of 50 to 55 F, depending upon outside air temperature and building load, and system water is routed through the condenser to be delivered to the heating coils at 100 F.

Upon a demand for cooling in excess of the capacity of the cold deck well water coils, well water is routed through the condenser, at approximately 65 F entering water temperature, and system water is routed through the evaporator to be delivered to the cooling coils at 42 F.



HOT AND COLD AIR DECKS provide simultaneous heating and cooling, essential for this building since some interior zones require cooling during the heating season. Framework for the ducts before installation is shown here

The primary control consists of an electronic system, with master controller in the return air, and reset controllers, one for winter compensation and one for summer compensation, in the outside air. Through a step controller, the electronic system positions the three-way valves and starts and stops the pumps and compressor as required. Once the compressor has been started, its capacity is modulated to the system requirements, according to condenser or evaporator leaving water temperature, with proportionate electrical consumption. Since the average point of compressor operation will be at approximately one-half load, the modulating feature will effect a considerable reduction in electrical energy use.

All controls, starters, and instruments are located in a free standing, enclosed, multi-unit control center in the main equipment room opposite the compressor unit. Two sets of watt hour, demand, and time meters are provided in the control center so that performance of the system on either the cooling or heating cycle can be determined.

Provide for Emergencies

As with all telephone exchange installations of this type, a standby generator plant has been provided. The diesel engine driven generator has adequate capacity to permit the entire air conditioning system to operate in case an outage of the primary power source occurs.

During normal operation of the system, the deep well pump in the supply well delivers well water to the system, and the water is sent back into the ground through the waste well. At such time when repairs are to be made to the supply well, a bypass has been provided so that under repair or emergency conditions a deep well pump can be installed in the waste well to supply water to the system. At such times the water is wasted to the storm sewer.

Calculate Performance Factors

The calculated performance factor for the entire system for the winter heating season was determined as 4.0. The inputs to all auxiliaries were used to determine the above value. The auxiliaries are the deep well pump, system circulating pump, and main fan. Without considering the inputs to the main fan and system circulating pump but considering only the inputs to the compressor and deep well pump, the performance factor for the same period was determined as 5.0.

Studies were made of the rate schedule of the electric utility company servicing this building. For the anticipated maximum kva of demand and the kwhr of energy consumed, it was determined that the average power rate was approximately $0.0125 per kwhr. The following is offered for comparison:

1) Heat pump system with performance factor of 5.0, using current at $0.010 per kwhr, the cost per million Btu = $0.58.

2) Heat pump system with performance factor of 5.0, using current at $0.0125 per kwhr, the cost per million Btu = $0.73.

3) Heat pump system with performance factor of 5.0, using current at $0.0150 per kwhr, the cost per million Btu = $0.88.

4) Gas fired system at 75 percent efficiency using natural gas at 1000 Btu per cu ft at $0.65 per 1000 cu ft, the cost per million Btu = $0.87.

5) Oil fired system at 70 percent efficiency using 140,000 Btu per gal oil at $0.12 per gal, the cost per million Btu = $1.23.

Standard Equipment Selected

The various items of equipment are the standard products of the manufacturers. The deep well turbine pump has a capacity of 135 gpm, 10 of which are used for motor cooling, with a total lift in the well of 125 ft. The system circulating pump has a capacity of 150 gpm. The refrigeration compressor unit has a nominal capacity of 50 tons. A 60 in. diameter, double inlet, double width fan with backwardly inclined blades circulates 56,300 cfm through the system.

The reinforced concrete curtain wall structure has 53,424 sq ft of floor area and a total cubical content of 838,260 cu ft. The cost of the wells and heat pump system was $153,864. The unit costs were as follows:

Heat pump system

$1280 per ton
2.88 per sq ft of floor area
0.18 per cu ft of building volume

Total construction

$12.90 per sq ft of floor area
0.83 per cu ft of building volume

The architect for the project was William H. Kremer. The system was installed by the T. O. Murphy Co. ∓

TESTS SHOW—

Aluminum Alloy Welding Neck Flanges' Performance Equal to Carbon-Steel

. . . if made to ASA B16.5 dimensions

BY H. H. GEORGE*, E. C. RODABAUGH**, AND DR. M. HOLT***

Recent tests indicate that 6061-T6 aluminum alloy welding neck flanges made to ASA B16.5 dimensions are essentially equal in performance to comparable carbon-steel flanges. Also, it appears that 6061-T6 welding neck flanges, when used at subzero to atmospheric temperatures, can be given ASA B16.5 ratings for carbon-steel flanges at 100 F.

Although no direct test data is available on the behavior of 6061-T6 flanged joints at elevated temperatures, ratings at temperatures up to 400 F may be obtained by reducing the rating at 100 F in proportion to the yield strengths of 6061-T6 material at temperature, as is indicated in Table 1.

The tests indicate that 6061-T6 slip-on flanges are significantly affected by the heat of welding, the severity varying with the welding procedure used and the size of flange. The available test data does not give a completely adequate basis for establishing ratings of 6061-T6 slip-on flanges. However, it does indicate that a rating of two-thirds that of welding neck flanges would probably be satisfactory.

Test Results Interpreted

Measured strains in the bolts were averaged and converted to equivalent stresses on the nominal root area of the bolts. The leakage pressures were plotted against bolt stresses, flange edge deflections were plotted against bolt stresses, and flange dishing measurements were summarized.

The test results may be interpreted as follows:

a) Test results are compared with ASA B16.5 ratings in Table 2. All 6061-T6 as-welded flanged joints held at least twice the ASA B16.5 Class A 100 F rating for carbon-steel flanged joints when initially bolted to 40,000 psi bolt stress. All 6061-T6 flanged joints held at least three times the ASA B16.5 rating when initially bolted to higher stresses; whereas, the required test pressure for the installed flanges — "American Standard ASA B16.5 Steel Pipe Flanges and Flanged Fittings," published by The American Society of Mechanical Engineers, 1953 — is only 1.5 times the 100 F rating.

The 8 in. welding neck flanges showed negligible permanent distortion after testing, and no doubt were capable of holding much higher pressures than those attained in these tests, which were limited by pipe failures. The 12 in. welding neck flanges were permanently distorted after test, but were still entirely usable and probably could have carried higher pressures than those reached in these tests.

The slip-on flanges were dished to the point where the outer edges of the flange rims were either touching or almost touching so that their capacity, as raised face flanges, had almost been reached in these tests.

b) Comparing 6061-T6 and steel 12 in., 300 psi flanged joints, the steel flanged joints have slightly higher leakage pressures than 6061-T6 flanged joints, but this difference is not believed to be significant, particularly in view of the fact that all joints held more than twice the required test pressures.

Although both the steel and 6061-T6 flanges, as obtained from stock, had yield strengths averaging about 40,000 psi, the value for the steel flanges was substantially higher than the specified minimum of 30,000 psi; whereas, the value for the 6061-T6 flanges was only moderately higher than the specified minimum of 35,000 psi.

TABLE 1—SUGGESTED CLASS A RATINGS for 6061-T6 aluminum alloy welding neck flanges made to the dimensions of ASA B16.5 are given here

Temperature, F	Yield strength (0.2 percent offset), psi	Pressure rating, psi		
		150 Series	300 Series	600 Series
Up to 100	35,000	275	720	1440
150	34,500	255	710	1420
200	34,000	240	700	1400
250	32,900	220	675	1350
300	27,400	175	565	1130
350	20,000	120	410	820
400	13,300	75	275	550

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*Manager of Research, Tube Turns, Div. of National Cylinder Gas Co.

**Senior Research Engineer, Tube Turns, Div. of National Cylinder Gas Co.

***Asst. Chief, Engineering Design Div., Alcoa Research Laboratories

This article is adapted from a paper presented at the recent ASME Petroleum Mechanical Engineering Conference, Dallas, Texas.

TABLE 2—LEAKAGE PRESSURES of 6061-T6 aluminum alloy welding neck and slip-on flanges are compared here with ASA B16.5 ratings

Test No.	Flanges: Nominal size, in.	Flanges: Pressure series, psi	Flanges: Type	Flanges: Material	Leakage pressure at bolt stress of 40,000 psi	Maximum pressure held*, psi	Ratio of leakage pressure to class A rating at 100 F**: S_b = 40,000	Ratio of leakage pressure to class A rating at 100 F**: Maximum held
1	8	150	WN	6061-T6	1100	1065+	4.00	3.87
2	8	150	WN	6061-T6	1000	930+	3.64	3.38
3	8	150	SO	6061-T6	600	......	2.18	...
3a					950	1095+	3.45	3.98
4	8	150	SO	6061-T6	750	......	2.73	...
4a					800	1065+	2.91	3.87
5	12	300	WN	6061-T6	1800	2910	2.50	4.05
6	12	300	WN	6061-T6	1750	......	2.43	...
6a					2000	2450	2.78	3.40
7	12	300	SO	6061-T6	1700	......	2.36	...
7a					1800	2250+	2.50	3.12
8	12	300	SO	6061-T6	1750	2685+	2.43	3.73
9	12	300	WN	A1810Gr I	2250	2900	3.13	4.03
10	12	400	SO	A181-Gr I	2150	3000	2.98	4.17

* + indicates pipe or weld failed.
**ASA B16.5 Class A ratings for carbon steel flanges at 100 F, 275 psi, and 720 psi for 150 lb and 300 lb series, respectively.
Test Nos. followed by *a* indicate a repeat of the same test assembly.

Deformation measurements show that 6061-T6 welding neck flanges performed as well as the comparable steel flanges. On the other hand, 6061-T6 slip-on flanges show more deformation than comparable steel flanges.

c) Comparison of 6061-T6 flanged joints "as-welded" with similar assemblies "reheat treated after welding" is not entirely satisfactory because the reheat treatment used did not restore the original properties of the 6061-T6 material. The comparative performance is, however, consistent and informative.

Deformation measurements show the "as-welded," welding neck flanges to be equal to those reheat treated, indicating that the local reduction in tensile properties from welding has little effect on the flange strength.

Slip-on flanges "as-welded" have considerably more deformation than the comparable "reheat treated" slip-on flanges, indicating that the heat of welding has significantly affected the strength of slip-on flanges. However, as shown in Table 2, both sets of flanges developed leakage pressures at least two times the rated pressure.

d) As to the extent of the zone affected by the heat of welding, hardness surveys indicate that the heat affected zone of welding neck flanges was highly localized, the entire flange ring and most of the hub being unaffected. The slip-on flanges were affected throughout the cross section; the 8 in. flanges were much more severely affected than the 12 in. flanges. Tensile tests agree with these hardness surveys.

In view of the marked reduction in hardness of the

. . . ran tests to study effect of reduction in tensile properties on 6061-T6

ALUMINUM and aluminum-alloy piping systems have proven satisfactory and economical for certain applications, such as those in which (a) the operating temperature is low, (b) the purity or color of the product must be maintained, and (c) the corrosion resistant qualities of aluminum are required. Aluminum-alloy flanges made to the standard dimensions of American Standard ASA B16.5 (1) are commercially available in at least two aluminum alloys: 3003-F and 6061-T6 (alloys M1A and GS11A, respectively, of ASTM Specification B247).

Flanges of these alloys, however, have not been assigned standard pressure-temperature ratings as have ASA B16.5 flanges made of a number of ferrous materials. Of these two aluminum alloys, 6061-T6 is particularly satisfactory as a flange material because of its high yield strength, the specified minimum being 35,000 psi. The specified mechanical properties of 6061-T6 alloy, a heat treatable alloy, are developed by a solution heat treatment followed by a precipitation or aging treatment.

Ratings of ASA B16.5 steel flanges at atmospheric and moderately elevated temperatures were established on the basis of yield strength of the flange materials. Since the specified minimum yield strength of 6061-T6 is as high or higher than the yield point of a number of the steels presently included in ASA B16.5, it might be expected that 6061-T6 flanges would perform as well as steel flanges at atmospheric temperatures. However, where flanges are welded to the pipe (welding neck and slip-on types), there is an additional factor to be considered: the heat of welding lowers the tensile properties of 6061-T6 material. It is apparent that the material near the weld will be overaged by the heat from welding.

What effect, if any, does this reduction in tensile properties have on 6061-T6 flanged joint performance? To determine this, and thereby provide a basis for the establishment of suitable pressure-temperature ratings for 6061-T6 aluminum-alloy flanges made to the dimensions given in ASA B16.5, a series of tests was made.

How Tests Were Made

The principal part of the investigation concerned 8 in., 150 psi and 12 in., 300 psi welding neck and slip-on, 6061-T6 flanges along with comparative tests of 12 in.

8 in. flange section, another 1 in., 150 psi slip-on flange was welded to 3003-F pipe, using 4043 filler metal.

Markings were placed on the flanges before welding to indicate maximum temperatures reached during welding. This flange was then sectioned and the hardness determined over the cross section. Again, the 8 in. flange was affected throughout the cross section, but much less severely than the flanges of test assembly No. 3.

It appears that substantial variations in heat effect on slip-on flanges can be obtained by changes in the welding procedure. Further, since 8 in. flanges were more affected than the 12 in. flanges, it appears that a size effect may be present.

The 12 in. slip-on flanges were preheated to 300 F for welding. However, data given by J. A. Nock, Jr., in an article, "Heat Treatment and Aging 61S Sheet," in the April 24, 1947, Iron Age, indicates that this would not directly affect the tensile properties of 6061-T6 aluminum alloy. Temperatures up to 700 F were reached at the flange ring edge.

Unpublished data from studies conducted at Alcoa Research Laboratories indicates that holding at a temperature of 700 F for only 1 min will reduce the tensile strength and yield strength of 6061-T6 by approximately 50 percent. Thus, it can be seen that a welding procedure should be used that will keep the time-temperature factor low.

Results of repeat tests of four aluminum flanges along with those of the original tests are shown in Table 2. The "retests" generally give higher results than the original tests. This behavior follows from the fact that if the initial bolt stress produces yielding, introduction of internal pressure produces additional loads on the flange, causing further yielding in a direction to reduce the bolt load. Owing to cold-working of the flange material plus redistribution of the flange stresses, a second application of these same loads would produce little or no additional yielding.

For example, one typical test to show the permanent loss in bolt load at the higher bolt stresses and pressures was run twice. In the first test, the initial bolt stress was 48,500 psi and the bolt stress following the removal of the pressure was only 39,000 psi. In the repeat test, both the initial and residual bolt stresses were 42,500 psi. This implies that where flange yielding has occurred, a leaking joint might be made tight again by reapplying the same bolt stresses as were used in originally making up the joint.

Other Tests Confirm Performance Comparison

Several other tests that have been run on 6061-T6 flanges of ASA B16.5 dimensions during the past 5 years also show that 6061-T6 welding neck flanges are essentially equal in performance to carbon-steel flanges at atmospheric temperature. These include:

1) A hydrostatic test on a flanged joint consisting of a 4 in., 150 psi 6061-T6 welding neck flange welded to 4 in. standard weight 6061-T6 pipe.

2) Cyclic bending fatigue tests conducted on 4 in. aluminum flanged assemblies.

3) A hardness survey across a section of a 6 in., 600 psi 6061-T6 welding neck flange welded to 3003-H18 standard weight pipe using 4043 filler metal.

flanged joint performance and to establish pressure-temperature ratings

carbon-steel flanges, all flanges being dimensionally in accordance with ASA B16.5.

Ten flanged joints were tested. Each test assembly consisted of a pair of flanges attached to pieces of straight pipe with the opposite ends closed with welding caps.

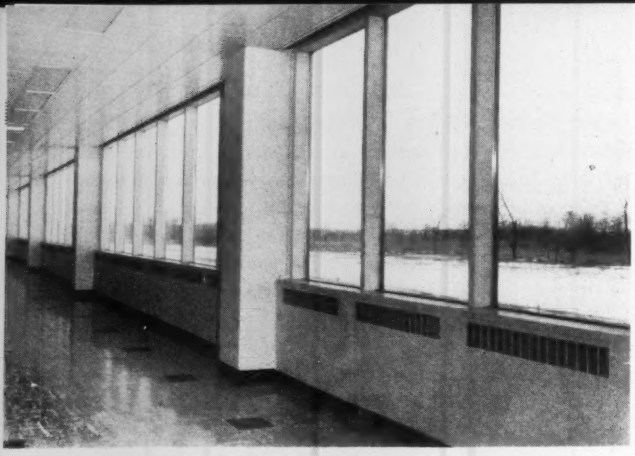
The raised faces had the normal facing finish produced by a 1/16 in. radius round-nose tool at a feed of 1/32 in. per revolution. All gaskets were cut from 1/16 in. thick, asbestos-composition sheet; the dimensions corresponding to those of ASA large tongue facings, viz., 10 5/8 in. OD by 9 3/8 in. ID for the 8 in. flanges and 15 in. OD by 13.5 in. ID for the 12 in. flanges. The flanges were bolted together with alloy-steel studs (Grade B7 of ASTM A193) and ASA heavy nuts. Four studs in each assembly were machined in the central portion so that two SR-4 strain gages could be attached and the bolt stresses deduced for various tightening torques.

The pipe wall thickness was selected so as to have pipe with a bursting strength of about four times the ASA B16.5 atmospheric ratings for carbon-steel flanges. Accordingly, the pipe would be rated about the same as the flanges. Heavier pipe might be considered to reinforce the flanges excessively for test purposes; lighter pipe would result in premature failure of the pipe.

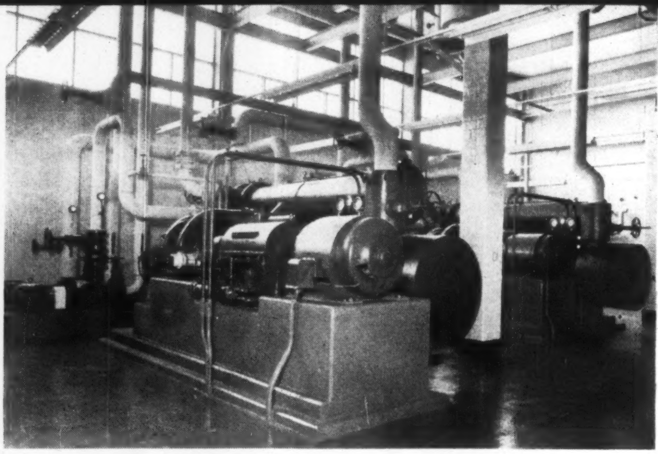
Each of the flanged pipe test assemblies was hydrostatically tested after each of several increments of bolt torque. The pressure was increased in steps until flange leakage occurred. The leakage pressure was defined as that pressure step at which the first drop of water emerged from the flanged joint. The pressure step at which leakage occurred could be accurately defined, since if there was any leakage at all it was rather profuse. Between steps in bolt torque, the pressure was entirely released but only in the test of one assembly was the bolt torque also decreased to zero before the next increment was applied.

In addition to leakage pressures, axial deflections of the rim of the flange ring were measured at each increment in bolt torque, the zero condition for this measurement being taken as the first increment of bolt torque. This measurement includes the deflection of the two flanges and the deformation of the gasket.

After completion of these tests, the flanges were sectioned for tensile test coupons and for hardness surveys.≠



CONTINUOUS CONVECTORS, supplied by a separate hot water system, overcome winter cooling under glass

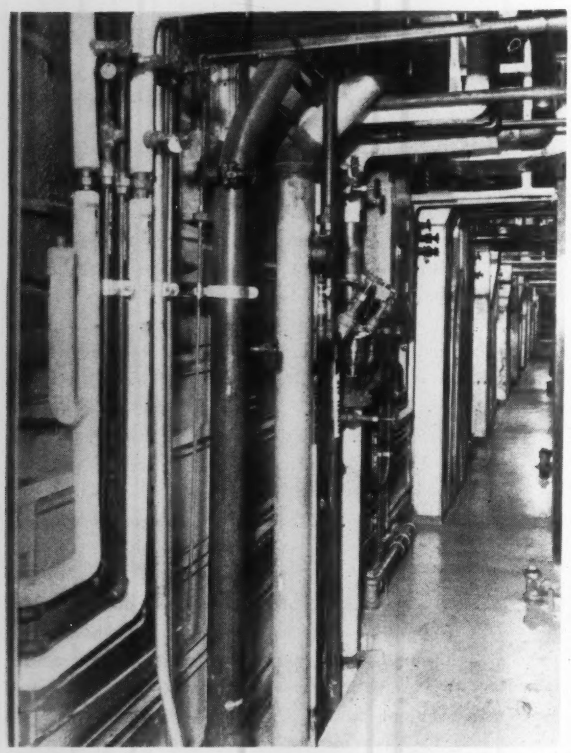


TWO CENTRIFUGAL COMPRESSORS supply chilled water to several fan units for the laboratory area

Here's How Flexible Systems

BY E. W. HOLLISTER
District Engineer
The Austin Co.

FROM an air conditioning and heating standpoint, one of the most challenging assignments our engineers have faced in some time was the new Parma Research laboratories of the National Carbon Co. in Parma, Ohio, just south of Cleveland. National Carbon is a division of Union Carbide Corp.



SERVICE CORRIDOR — one of six — contains a complete set of services, permitting great flexibility

Following are some of the design requirements that had to be met in this new plant, which is on a 126 acre plot and includes approximately 175,000 sq ft of floor space:

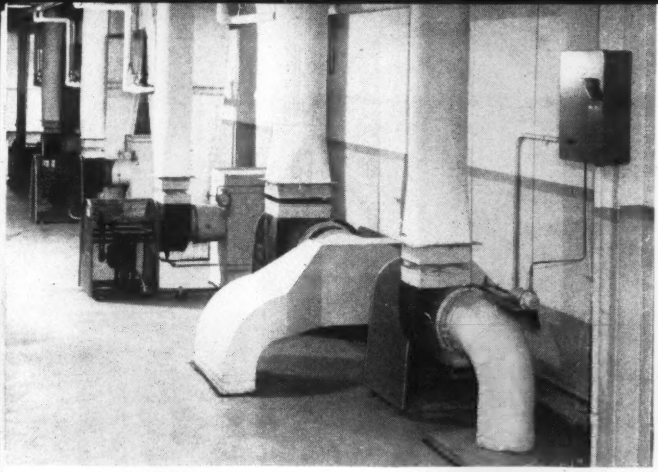
1) Each of 158 laboratory units, or modules, had to be supplied individually with a complete set of services, including differing electrical voltages, normal laboratory gases, and air conditioning and heating. The modules occupy a block shaped area, totaling about 70,000 sq ft, in the center of the main laboratory structure, and are completely enclosed by perimeter corridors. In turn, the area containing the laboratory units is further divided by corridors into six smaller blocks.

2) Each module had to receive 100 percent outside air. Moreover, not only was all the air to be exhausted to the outside through hoods or room exhaust, with no recirculation, but the air was to be exhausted independently from each module. The system thus had to be controlled so there could be no mixture of air in the exhaust system and no infiltration between laboratory units.

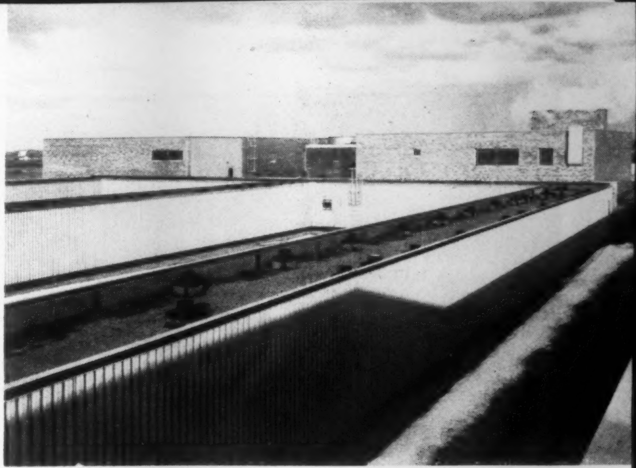
3) The flexibility of the system had to permit not only different conditions in each module, but also varying conditions from time to time in the individual modules. Within feasible limits, there had to be provision for future requirements that might be quite different from the original ones. Indeed, the requirements of many modules have already changed from what they were when the laboratories opened.

4) The system had to take into account the fact that the exterior design of the building called for maximum glass areas facing all directions, with no provisions for sun shades or other methods of eliminating the solar effect.

5) Certain areas were to be used only intermittently, such as the library, cafeteria, auditorium, and some offices.



INDIVIDUAL EXHAUST FANS for 158 modules are located in areas like this



ROOFTOP PENTHOUSES contain exhausts from lab modules, cooling tower and fan rooms

Serve 158 Unit Lab

6) The possibility of future expansion had to be reckoned with.

Originally it was planned to supply the entire structure from a single chilled water system. When the final loads for all of the areas were determined, however, it was found that such a plan would be impractical for cooling the cafeteria, auditorium, or other service areas at night when the main building equipment was not operating. It was decided, therefore, to use separate direct expansion refrigeration systems for these areas.

This arrangement not only takes care of ordinary daytime requirements, but also provides the best approach for evening or weekend occupancy. Moreover, it is most satisfactory for the areas in question because they have particularly large amounts of glass with southerly and westerly exposures. In winter, especially, a switch from heating to cooling may be required within a few minutes if the sun breaks through the frequent Cleveland cloud cover. The reverse may be necessary, of course, if a sunny winter day clouds over quickly.

The system for serving the laboratory units is quite different and separate. As finally set up, this system includes two centrifugal compressors supplying chilled water to a number of fan units for the laboratory area. One compressor operates automatically anywhere within its capacity. It has fluid drive, automatic capacity controls for the suction damper, and a hot gas bypass valve for loads of less than 20 percent capacity. With such a completely automatic compressor, on-off surges of demand for electric power are avoided.

The other compressor, with manual capacity controls, is used only when the capacity required is greater than that of the compressor with automatic controls.

Six service corridors in the laboratory block are used to bring individualized services to each module. Each laboratory gets 750 cfm of electronically filtered air, conditioned to a temperature of 58 F. This air comes from four main supply units, containing electrostatic filters, heating and cooling coils, and supply fans. The amount of air at this supply temperature was deemed sufficient to reduce humidity to a satisfactory level and to maintain comfort conditions with any of the known loads required. Loads needed for the laboratories were determined from previous experience in another location.

When the maximum design load is not developed, the air is tempered as required for each module by a thermostatically controlled reheat coil. Exhaust fans, located in an equipment area over the laboratories, pull all used air direct from each module to the outdoors. There is room in the exhaust area for special treatment of exhaust if it becomes necessary.

To maintain maximum flexibility in heating, it was decided to use hot water, supplied at 240 F, from two gas fired, package type generators. This water is circulated, at variable temperatures controlled by an outdoor thermostat, to the preheat coils in the air handling units. The reheat coil in each laboratory is furnished constant temperature water at 180 F, with the temperature controlled by a bypass valve.

A separate hot water system, using continuous convectors under all glass, is used to overcome winter cooling effects in nonlaboratory areas with glass walls, such as the corridors, cafeteria, and offices. These areas also receive the normal amount of conditioned air.

Certain special laboratories have separate refrigeration equipment. One such area requires constant humidity and constant temperature at all times, while another must have unusually low humidity.

Such a complex air conditioning system—or series of systems—naturally depends for its successful operation on a complete balance of air supply, air exhaust, and hot and chilled water. The present satisfactory operation attests to the soundness and flexibility of the design that provided this necessary balance. ‡

Five Systems Distribute Conditioned

BY VINCENT A. BIANCULLI
Chief, Heating, Ventilating, and Air Conditioning Dept.
Syska & Hennessy, Inc.
Consulting Engineers

After two full heating and cooling seasons, it is now possible to report that the heating and air conditioning systems installed in the Manufacturers Trust Co. branch bank at Fifth Ave. and 43rd St., New York City, operated successfully.

The building design, conceived in 1953, is a daring departure from the usual monumental granite and marble exterior. The entire bank operation, including the bank vault, is clearly visible to anyone walking along the streets.

The five story, 125 ft × 100 ft building is made up of two open banking floors, the second of which is set back from the exterior building walls in the form of a mezzanine floor, two office floors, and an executive floor. The exterior, except for the dark colored glass spandrels, is made up of clear glass sheets up to 9 ft wide × 22 ft high × $\frac{1}{2}$ in. thick.

The spandrels above the first floor contain the mechanical and electrical distribution systems. The clear glass runs from floor to ceiling. An aluminum rail is installed along the exterior walls to prevent anyone from walking into the glass. Due to the open floors, it was necessary to create a continuous shaft space along the southwest and part of the northwest walls to handle the necessary ducts, piping, and electrical service.

Single, Dual Ducts Carry High, Low Velocity Air

The air conditioning distribution system is made up of five systems. A modified high velocity dual duct system serves the first to the fourth floor exterior southeast zone. This system consists of dual duct risers in the continuous shaft space.

Single high velocity ducts on each floor are fed from the dual duct system through automatic dampers. The dampers are controlled by room thermostats in the southeast zone. During the winter season the system helps maintain zone temperatures because the radiation is de-

SPANDRELS above first floor of Manufacturers Trust Co.'s trend setting branch on Fifth Ave. contain mechanical and electrical distribution systems

EXECUTIVE OFFICES on the penthouse floor are conditioned by a dual duct system

Air in Glass Sheathed Bank

signed to heat to 50 F when the outside temperature is 0 F.

Two low velocity conventional systems take care of the first to fourth floor interior and northeast zones. Averaging thermostats maintain the interior zone temperature. As the northeast zone is a continuation of the interior zone, thermostats in the zone operate electric strip heaters in the duct system to maintain zone temperature and again to assist the radiation in winter.

A conventional velocity dual duct system is used to condition the executive floor. Thermostats in each room operate dampers in the hot and cold air ducts to maintain temperature and again to assist in maintaining temperature during the winter. Due to space conditions, the air in the cold duct is approximately 30 F below room temperature to maintain conditions at peak summer design temperatures.

A low velocity package air handling unit is used to condition the lunch room, engineer's office, and allied spaces in the basement.

As the building is completely sealed except for doors, part of the return air from the air conditioning system is used to ventilate the fan room, refrigeration machinery room, and storage spaces.

Reduce Purchased Steam from 140 to 45, 5 Psig

Steam at about 140 psig is supplied by the New York Steam Corp. The steam pressure is reduced to 45 psig and is delivered to hot water heating converters, unit heaters, and the domestic hot water heater. The steam is further reduced to 5 psig for the heating coils.

Two systems of forced hot water heating are used to heat the building; one for the first to fourth floors and the other for the executive floor. Except for the first floor, the finned type pipe radiators are partially recessed in the floor. The first floor is heated by three tier high finned pipe radiators, as the glass is 35 ft high.

Outdoor thermostats control steam to the converters to maintain the desired indoor temperature.

Two electrically driven reciprocating compressors totaling 280 tons of refrigeration capacity provide 40 F chilled water to the five air conditioning systems. Steam was not used for refrigeration because of the architectural requirements of keeping the cooling tower to a minimum size. Also, because of the proximity of adjacent buildings, the discharge air temperature from the cooling tower had to be held to a minimum.

Skidmore, Owings, and Merrill were the architects. ∓

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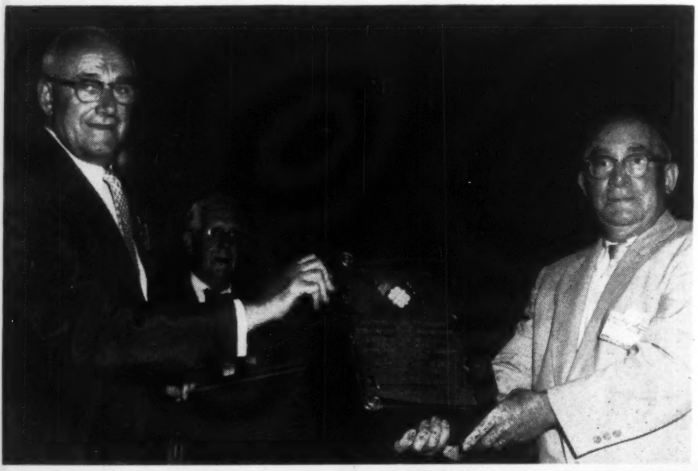
CONGRATULATING Lawrence Hollyer on his winning the fourth annual contest is Peter J. Davis of Chicago, left, new chairman of the National Joint Pipe Fitter Apprenticeship Committee. Center is Grant J. Hayes, Indianapolis, for many years chairman of the committee. He holds a certificate with James P. McNeil, second place winner, as James K. Reeves, who won third place, looks on

Apprentices Vie for Top Scores, Awards While Instructors Bone Up

. . . at fourth annual UA session at Purdue in August. Apprentice pipe fitters displayed their skills competitively and winners received top awards. At the same time, 264 instructors attended refresher courses on subjects they will teach — and learned how to teach them

PETER T. SCHOEMANN, general president of UA, presents plaque for first place winner to Edmund P. Burns of Local Union 636, Detroit. Mr. Burns taught winner Hollyer



APPRENTICE competes in oxyacetylene welding test. Other tests involved assembly of valves, traps, and controls

WELDING SPECIMENS are being examined by H. A. Sosnin. Apprentices were required to display variety of welding techniques on both steel pipe and copper tube

New skills required in fabricating the alloys necessary to withstand the high temperatures and pressures of many new applications are being encouraged by the United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry through its annual apprentice contest at Purdue University.

The fourth such contest was held August 12 to 16, in which 33 pipe fitter apprentices participated.

Concurrent with the contest was an instructor training course in which 264 apprentice instructors from 40 states, Alaska, and four Canadian provinces participated.

With the new demands from nuclear power plants and advanced process piping applications the need for upgraded skills in the mechanical (heating, piping, and air conditioning) contracting field is quite apparent. This is of urgent concern not only to the contractors responsible for installing these systems, but also to the engineers who design them, to the manufacturers who supply materials and equipment, and to building and plant owners, managers, and operating and maintenance engineers as well.

One big step in recognizing that something should be done is the apprentice contest and instructor training program of the UA. with Peter T. Schoemann, general president, constantly striving for advanced methods. Now in its fifth year the program is sponsored by the UA on the international level and by the local unions on the state and local levels. The Mechanical Contractors Association of America plays a very important part in this program, as do manufacturers in the industry who contribute equipment for use in the contest and courses.

Test Knowledge, Abilities

In competition, the apprentice contestants who have won their state contests are put through a vigorous series of tests to determine their basic knowledge and skills of pipe fitting. One half of the grade made by the contestants is based on written tests, while performance tests make up the other half.

The written tests include questions on steam heating systems, gravity and forced hot water heating systems, elementary physics pertaining to gases, pressures, heat, and change of state of fluids. Also, the oil burning cycle is covered, as is the steam power cycle including types of boilers, pumps, and all accessories, the refrigeration cycle, air conditioning cycle, industrial and process piping, welding processes, all types of controls, and other subjects such as safety methods and proper care of tools and equipment.

This year the performance tests consisted of four parts. These were:

1. A welding project using 4 in. standard or Schedule 40 steel pipe 24 in. long with both ends machine beveled 37½ deg ± 2½ deg (35 to 40 deg). Contestants were required to:

a) Make templates for a 4 in. tee branch connection.

b) Lay out, cut, bevel, and tack a tee joint and weld a butt joint. Cut the pipe 4 in. from one end and 10 in. from the other end. This will leave a 6 in. piece for the tee branch. Cut and bevel the 10 in. piece and the 6 in. piece for the tee joint according to dimensions furnished, using templates. Fit and tack the 90 deg tee joints. Join the machine beveled ends of the 4 in. and 10 in. pieces. Weld half-way around in a fixed horizontal position and the other half-way around in a fixed vertical position.

Maximum time: 5 *hr*.

2. The copper tube project required:

a) Cutting to dimensions, preparing, and assembling 1½ in. and ¾ in. copper tube and fittings according to drawing.

b) Silver brazing and sweat soldering joints.

c) Cutting and splitting joints with hacksaw for examination.

d) Pulling sweated joints apart for examination.

Maximum time: 3 *hr*.

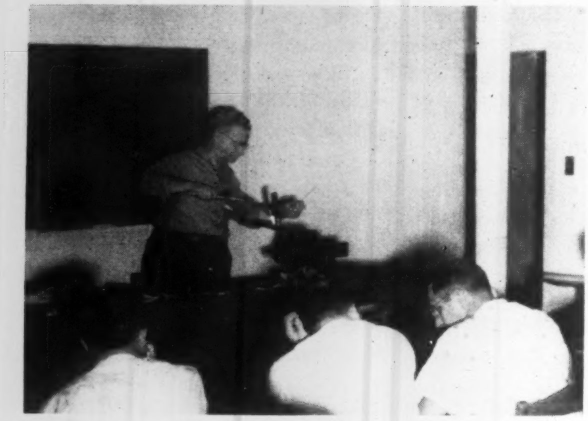
3. The assembly project involved the assembly of valves, traps, controls, and similar devices.

Maximum time: 2 *hr*.

4. The rigging and signaling project covered:

◀ **INSPECTION** in inert gas shielded arc welding by apprentice instructors holds class interest as bead is applied in joining two sections of 4 in. pipe

▶ **CUTTING THREADS** by power unit is demonstrated by Carl Peterson. Reaming and cutting of pipe were also performed using the unit.



◀ **SILVER BRAZING** of joints in copper tubing, says Barrie Hackett, requires that all joints be cleaned thoroughly. Also, he emphasizes the use of a good flux

a) Rigging with rope for hoisting various objects.

b) Hoisting signals for crane operator.

Maximum time: 2 *hr*.

Top Scores Bring Big Prizes

First place winner and recipient of a $1000 cash award was Lawrence Hollyer, Detroit, who had an average score of 88.65. In second place was James P. McNeil, Omaha, with an average of 88.10 and James K. Reeves of Augusta, Ga., was third with 87.55. The second and third place cash awards were $500 and $250, respectively. Plaques for each of these winners were awarded to their local unions by the UA.

Wide Choice of Subjects

Among the subjects discussed in classroom sessions for the apprentice instructors were fabricating and welding plastic pipe and glass pipe fitting. Summaries of the material on these two subjects are presented in separate articles in this issue.

Other sessions covered pipe and bolt threading, pipe bending, silver brazing and soldering, inert gas shielded arc welding, coated electrode welding, and how to make and use templates.

To prepare the instructors for conducting classes of their own, material was presented on such subjects as how to make a demonstration and how to use visual aids.

The 264 instructors, whose enthusiastic attendance and participation was marked at all the sessions, expressed hope that the training courses will be continued and expanded, since they believe the courses will bring about an ever increasing improvement in the UA apprentice program. The training course has given the instructors, they say, a feeling of confidence that comes from knowing that they are provided with a well organized program and that they have the backing of the UA in their efforts to do a better job of teaching.

Through the course they are endeavoring to obtain a common goal —that of becoming fully qualified, competent instructors. +

Sam Lewis' Page

Pipe Fitter Apprentices Display Many Skills

Again this year I have served as one of the Judges of the pipe fitting apprentice contest held at Purdue University and sponsored by the United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry.

This fourth annual competition — evaluating the various skills such as welding techniques for piping — gave the entrants the opportunity to exhibit their workmanship and at the same time to continue their education.

The value of the benefits gained is great. We specify always that welding shall be performed by experienced mechanics who hold certification as competent workmen.

To qualify, welders must meet certain prerequisites. Almost anyone with enough heat in one hand and a metal rod in the other can fill a crack with molten metal, provided the open lips of the crack are looking up. But to accomplish this when the crack lips look down requires real skill and patience.

SAMUEL R. LEWIS, *consulting mechanical engineer and a member of HPAC's board of consulting and contributing editors, comments informally each month on practical heating, piping, and air conditioning problems.*

Attention is required by the welder to keep from getting burned by the liquid metal as well as by the torch.

The lips or groove at the joint must be tapered correctly and the lips and adjacent metal must be heated to a temperature that will permit the new metal to become a homogeneous part of the pipe.

Preparation of the lips between which the welding metal is to be blended is of vital importance and the oxidation of the metal due to high temperature and contact with air must be removed since this "ash of steel" or "scale" must not be allowed to weaken the new metal. Scale in the weld can cause leakage of the fluid that the piping is to convey.

These are but a few of the skills required of a competent welder. Activities such as those held at Purdue do much toward preparing the young apprentices for meeting these demands.

In this year's session competing apprentices participated in written as well as manual tests. They made templates for fabricating a tee and other fittings from straight steel pipe. Contestants demonstrated facility, or lack of it, in projects such as joining copper tubes, or cutting a steel pipe at the correct angle with an oxyacetylene torch and then welding the pieces into a tee or to a three-piece elbow. Emphasis in the instructions was placed on safety from falling objects and prevention of injury from fire or chemicals.

Concurrent to the contest, the UA conducted an apprentice instructors course for the purpose of teaching the latest procedures and theories of pipe fitting. Instructors for these classes were drawn from the engineering departments of several manufacturers and universities.

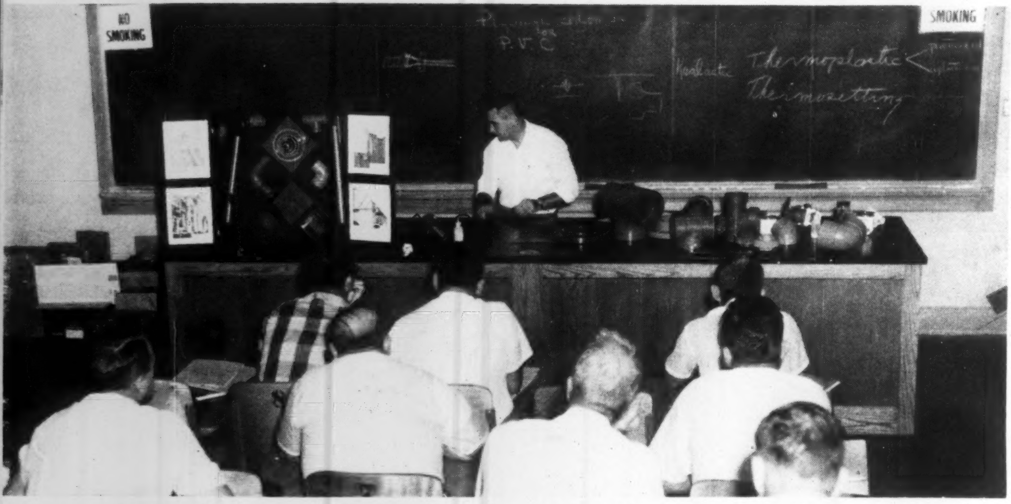
Members of this instructors staff delivered lectures and exhibited models for the information of those who will teach the apprentices during the next year. There were five days of instruction for these teachers. Thirty-four instructors between them held 16 class sections. Classes were small so as to encourage discussion between instructor and pupil.

Attention was given to temperature control and to familiarizing the teachers with the growing function of UA mechanics in installing equipment and piping for refrigeration.

There were exhibits of electric and gas welding equipment, hot water heating systems, high vacuum steam heating equipment, copper tubing, brass and ferrous metal valves, glass pipe, and plastic piping.

It was a real privilege to become acquainted personally with the engineers chosen for this instruction.

Likewise, it was inspiring to witness and judge the talents of the competing apprentices. ǂ



PROPERTIES of plastic pipe, how it may be used, what limitations should be observed, how to support various types are discussed at class for UA apprentice instructors

Fabricating, Welding Plastic Pipe

Summary of basic information about plastic pipe—as presented at UA apprentice instructors course—is given here. Discussed are its types, advantages and disadvantages, where it may be used, how to install it

PLASTIC PIPE and how to join sections of it was covered very completely in one of the classroom sessions for the apprentice instructors. The fundamentals and types of plastic pipe available for process piping applications were reviewed and it was noted how rapidly plastic was being accepted as a piping material.

For instance, in 1950 the dollar volume of all thermoplastic pipe was only $5 million. It is estimated that this figure will soar to $75 million for 1960. This minimum estimated value is based on the 1956 volume of $55 million.

The importance of specifying the type of plastic pipe to be used, was stressed. In this connection, it was mentioned that a liability suit for a large sum was filed recently because the specifications did not state exactly the type to be installed for handling some corrosive fluids in a plant.

Three general types of plastic pipe were outlined as follows:

a) *Polyethylene.* This is the most widely used. It is low in cost, flexible, and resists freezing.

b) *Kralastic.* This is the second most widely used. It is semi-rigid.

c) *Polyvinyl Chloride* (PVC). This is mostly used in the industrial field. It is very good for acids and alkalis. Type I PVC is unplasticized and has normal impact strength along with high chemical resistivity. Type II PVC is plasticized and has high impact strength but with less chemical resistivity.

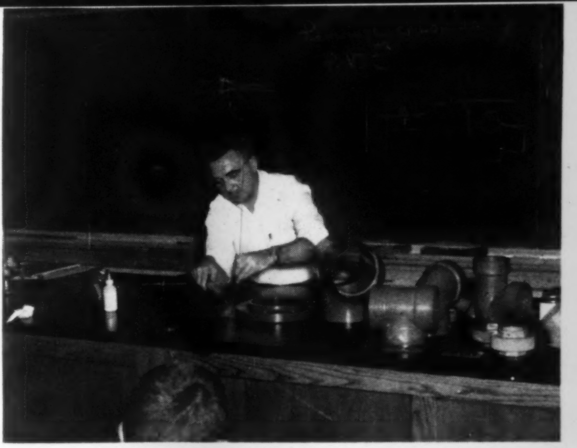
The principal design requirements and considerations in selecting plastic pipe are pressures, temperatures, the fluid being piped, pipe supports, and provisions for expansion.

The working pressures for PVC pipe should be no greater than 200 psi, according to one viewpoint. The shock pressure for any plastic piping system should not be greater than 50 percent of the burst pressure, or 500 psi. There is not complete agreement on this as developments are expected to increase these values. This includes design pressures for check valves, pumps, water hammer, etc. The weakest link in the system is, of course, the joints, valves, and other fittings.

The maximum recommended temperature is 150 F for all types of plastic piping systems.

The type of fluid, the time that it will be in the piping system, the velocity of the fluid, how it will be dumped, are all factors to be considered. For instance, if the fluid is to be in the piping system for only a few minutes, a slightly higher temperature than 150 F may be tolerated.

In general, plastic piping systems should be supported two to three times more frequently than metal pipe. If the temperature of the conveyed material is close to the maximum, a continuous trough may be the best method for supporting the pipe to prevent sagging. Pads should be



USE OF inert gas and compressed air gun which produces molten plastic bead at joint is new method of joining plastic pipe

used between the pipe and hangers if the pipe is to move. Compression bends and hook hangers are not recommended for plastic pipe systems. All heavy fittings should be supported individually so they do not hang on the connected pipe. If any portion of the piping system can be removed without altering the remaining portion of the system, it is then properly supported.

Bellows type and slip type expansion joints are suitable for permitting the high rate of expansion to be provided. Rubber clamp couplings are suitable if they can be placed in compression continuously.

Discuss Joining Methods

The oldest method of joining pipe is by threading. All plastic pipe can be threaded, but only Schedule 80 is recommended for threading, because, in the less thick wall sizes, the base of the notch may start a crack which could lead to fracture. Regular IPS dies may be used, but care should be taken to insure that they are sharp. Dull dies can also cause cracks leading to fracture.

Cooling the die with water when the threads are being cut will help to prevent cracks from forming. A plug should be inserted in the pipe to keep it from being deformed when the threads are cut. The die should not be backed off during cutting.

The fitting should be made up hand tight, plus one-quarter turn with a strap wrench. A pipe joint compound should be used when joining the pipe and fittings as it provides lubrication for the assembly operation and serves as a seal when the assembly is completed. Threaded pipe joints can withstand pressure immediately with no waiting period necessary.

Solvent cementing is an effective means of joining Schedules 40, 80, and 120 PVC pipe. The ends should be square cut and all burrs removed. The connecting surfaces should be cleaned in accordance with the instructions of the solvent cement manufacturer.

The connection should not be twisted nor moved in any way until the cement has set. A setting time of at least 48 hr should be provided before the piping system is subjected to working pressures and temperatures.

A new method for joining plastic pipe is the use of an inert gas and compressed air gun to produce a molten plastic bead at the joint. This type of gun used with a plastic rod makes it possible to produce a molten bead at the joint. ≠

The Pros and Cons of Plastic Pipe

Advantages—

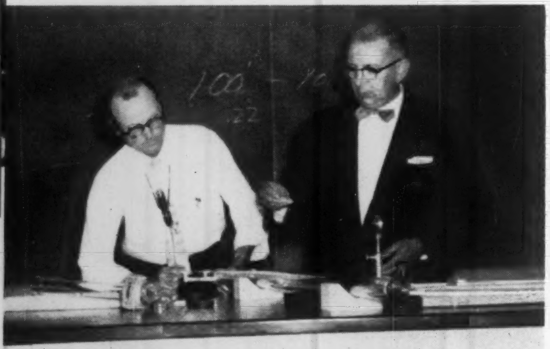
- Is light in weight.
- Resists galvanic corrosion and electrolysis.
- Resists attack from soils, algae, and atmospheric corrosion.
- Has friction coefficient of 1 — equal to that of glass.
- Can be bent in the field under heat. Even though it has a "memory" which may cause it to return to its original shape, shrink fittings can be used over the bent section to hold its form.

Disadvantages—

- Does not permit high temperature service. 150 F is usually considered maximum while −60 F is the present recognized minimum.
- Will not withstand higher pressures. A working pressure of 100 to 200 psi and a burst pressure of 1000 psi are considered maximum for PVC systems by some authorities. There is not complete agreement on this.
- Is relatively expensive compared with many piping materials, the cost comparing roughly with that of stainless steel pipe.
- Does not install as rapidly as metal pipe in plant applications where valves and fittings are a part of the piping system.
- Expands more than metal pipe. Expansion is several times greater and provisions must be made for this.
- Acceptability of plastic pipe would be greater if the manufacturers knew from engineers and piping contractors what qualities are needed. Also, there is a lack of knowledge of how to use plastic pipe in the most efficient manner.

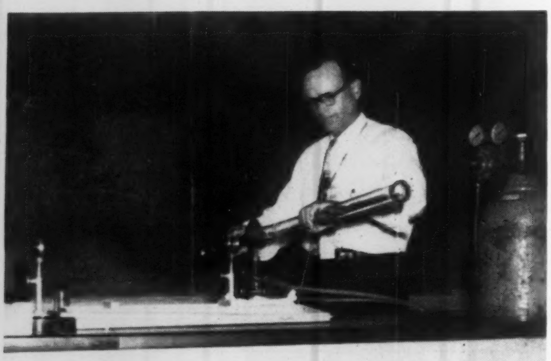
How to Cut, Fit Glass Pipe

Pipe fitters equipped with only a little know-how can perform in the field cutting and fitting of glass pipe, say authorities at UA apprentice instructors session. Characteristics, limitations of glass pipe are given here



Cutting . . .

. . . glass pipe accomplished by using special cutter which scores circle on inside of pipe. Cutter is inserted into pipe, rotated



Cracking . . .

. . . done in presence of gas-oxygen flame which is applied to outer circumference of pipe

Beading . . .

. . . cut end of pipe requires special ring burner. Pipe is rotated slowly in flame for uniform bead buildup

GLASS PIPE can be cut and equipped with flanges in the field by pipe fitters with a brief indoctrination of techniques, according to George L. Baker and John Post of Corning Glass Works, who demonstrated these techniques before the apprentice instructors.

Mr. Baker explained that glass pipe is a combination of boron and sand which has been made homogeneous under high heat. The pipe is corrosion resistant and suitable for most process applications except hydrofluoric acid and hot alkaline solutions.

An outline of the characteristics of glass pipe was presented, and the discussion of operating pressures, temperatures, and the lengths available is summarized here.

Recommended operating pressures are 50 psi for 1, 1½, 2, and 3 in. diameter pipe. The pressure should be no higher than 35 psi for 4 in. diameter nor 20 psi for 6 in. diameter. The maximum diameter of glass pipe available is 6 in. Lengths vary from ½ to 10 ft in increments of ½ ft up to 2½ ft and then 1 ft lengths from 3 to 10 ft.

Normal operating temperatures may reach 250 F. However, if the maximum operating temperature of 450 F is to be encountered, insulation over the pipe should be provided as a special precaution to protect the pipe from thermal shock. Minimum temperatures may be below freezing as long as the product being piped does not freeze.

Glass pipe may be cut on the job with a special cutter which is inserted into the pipe. This cutter scores a circle on the inside of the pipe permitting it to be cracked when a gas-oxygen flame is applied around its outer circumference. A special ring burner is used to put the bead on the cut end. The pipe is rotated slowly in the flame so that the bead may be built up uniformly. After the bead has been built up to the desired height, the pipe should be allowed to cool to room temperature.

The next step is to work the rubber gasket ring over the beaded end of pipe and fit it snugly behind the bead. The metal flange and a standard molded insert may next be assembled on the newly cut end. The pipe is now ready for installation.

For lengths that are not practical to cut and prepare the bead for the gasket, special spacers are available in ½, ¾, 1 and up to 5 in. lengths.

In order to provide for expansion of glass pipe, gaskets should be spaced in a line at the rate of one per each 10 ft. Straight runs of glass pipe between vessels should be avoided wherever possible. If the line can be angled with two or more 90 deg elbows, this will help to compensate for expansion.

Pipe hangers should be provided on both sides of the flanges connecting lengths of pipe. In other words, there should be two hangers in every 10 ft. Padding should be placed on the hangers to protect the glass from being scratched.

Adapters are available for connecting glass pipe to pipe made from other material. When the glass pipe is connected, ASME or ASA drilled screwed flanges should be used. The metal pipe flange should be screwed far enough to permit facing the end of the pipe, thus providing a flat bearing surface for connection of the glass pipe. ⌖

Plastic Ductwork Solves Ventilation System Problems

. . . installed as hoods, drops, plenums, risers, as well as ductwork, fittings, and stacks for big plating plant

CORROSIVE FUMES from plating tanks are exhausted through plastic duct system, shown here

Large amounts of plastic ductwork — polyester resin reinforced with layers of glass fiber mat — are incorporated in the new ventilation system serving the big bumper plating installation at the Hardware Div. plant of the Ford Motor Co., in Monroe, Mich. The two largest rack type plating machines ever built constitute one of the largest overall plating installations in the world, more than 709 ft long. The ventilation system has a capacity of more than 700,000 cfm.

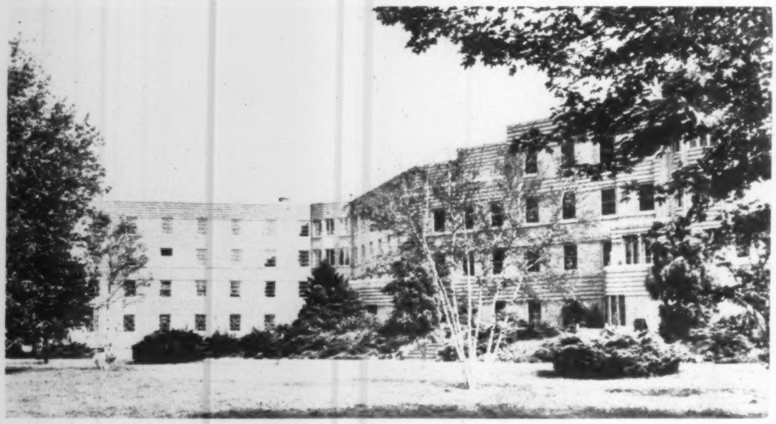
The installation requires 22 complete ventilating systems, including plastic hoods, drops, plenum chambers, risers, and ductwork to the air scrubbers, as well as fittings and stacks on the exhaust side of the air scrubbers. Plenums for the job are as much as 42 ft long and 14 ft in girth, while risers are up to 12 ft high.

Changes and repairs in ductwork have been made on the spot with little production loss due to downtime.

The multiple layers of glass fiber mat impregnated with polyester resin have been shown to provide a high impact strength. However, if the duct is broken, repairs can be made by using glass cloth soaked with polyester resin. This sets up to form a solid patch, integral with the rest of the duct. This procedure has been followed on this installation and has proved to be very successful.

The light weight of the ductwork appreciably reduced installation cost. For example, a 9 ft section, 38 in. in diameter, with a ¼ in. wall, weighs only about 185 lb. Also, because of its strength and lightness this installation required a relatively small number of duct hangers. ⌖

Photo courtesy the Durez Plastics Div., Hooker Electrochemical Co.



Modular Radiant Ceiling Makes Expansion Easy

. . . in new hospital wing

Reverse return hot water system selected to reduce need for balancing. Five exterior zones are controlled separately to provide flexibility

BY FRANK SULLIVAN
Consulting Engineer

THE NEW 142 bed, five story, 65,000 sq ft addition to the Mercy hospital at Rockville Center, Long Island, N. Y., is heated by radiant ceiling panels. The active heating portion of the ceiling comprises approximately one-third of the total ceiling area, which is uniformly finished with acoustical tile.

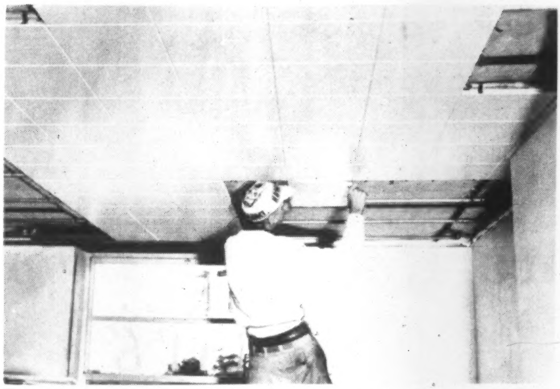
The hospital had an existing boiler plant which it wanted to use to heat the new building addition, but which was already near the limit of its capacity.

Each Exposure Is Heating Zone

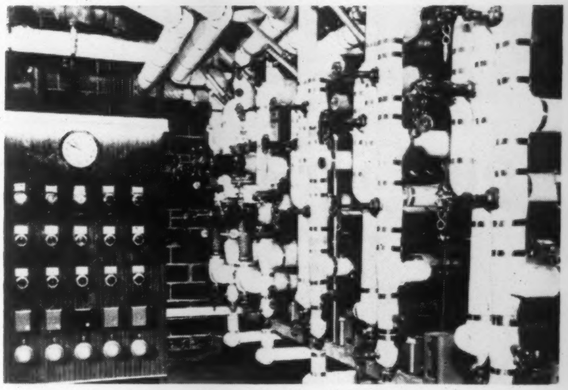
Since most of the new building areas consist of two and four bed wards, and the occupancy is stable, it was decided to use a zone control system. Each exterior exposure of the building constitutes one zone for heating. There are five exterior zones, each with its own hot water converter and separate zone circulating pump. In addition, a sixth converter was installed as a standby unit, so connected that it could immediately continue to supply hot water to any zone.

The convertors for the five zones are rated as follows: 2200 gph, 1600 gph, 300, 400, and 400 gph at a temperature of 110 to 130 F. The corresponding circulators are sized for 40, 30, 10, 10, and 10 gpm, with the largest motor being ¾ hp. The steam for the hot water converters is supplied from the existing boiler plant at 100 psig, reduced to 5 psig at the equipment room and controlled by pneumatically operated steam modulating valves.

The zone thermostat for each zone is on the exterior of the building at the second floor level and controls each zone for all five floors of occupancy. The outdoor master control resets a submaster immersion ther-



ALUMINUM PANELS are attached to ½ in. diam galvanized Schedule 40 steel piping by spring clips. Note sound absorbing blanket of glass fiber insulation above piping



CONTROL PANEL for ceiling radiant heating system contains for each zone switches for circulators, outside air reset, water temperature reset, and pump failure alarms

mostat in the discharge water line of each converter; this submaster control in turn controls the automatic steam modulating valve to the converter.

The controls are arranged so that when the outdoor temperature drops to zero F or lower, the water temperature to the zone is set for 140 F; when the outdoor temperature rises to 60 F, the water temperature is reduced to 100 F.

The utilization of direct steam control obviates the necessity of three-way valves for the individual zones. The control panel has the following controls incorporated in it:

- Zone switch for manual or automatic operation of zone circulators. One position for cutting in the standby circulator or any one of the other zones.
- Outside air reset, either on automatic or manual control.
- Water temperature reset for each zone.

The electric alarms to indicate pump failure on any zone are below these switches.

Pipe Laterals Spaced 1, 2 Ft

The entire heating system is laid out as a reverse return system, with supply and return risers at exterior columns at 20 ft intervals. An open expansion tank at the high point of the system provides for the venting, and the contraction and expansion of the water in the system.

The radiant acoustical ceiling is a combination of hot water piping and perforated aluminum panels that form the finished ceiling and the radiating surface, above which is placed a sound absorbing blanket of glass fiber.

The lateral pipes are an integral part of the ceiling, acting as the carrying "channels" for the aluminum panels. These laterals are ½ in. galvanized Schedule 40 steel pipe, spaced 2 ft on center, except those in corner rooms which have a greater heat loss. Here the laterals are placed 1 ft on center.

The pipes form a sinuous grid and are welded together with prefabricated U-bends. Supply connections to the individual grids are taken off at the exterior wall, and balancing fittings are provided at the return, interior, side of each grid.

Since the system was designed as a reverse return heating system, a minimum of balancing was required. The ½ in. pipe laterals are fastened with special spring steel clips to the standard suspension system as is used with other types of suspended acoustical ceilings.

Insulation Is 2 In. Thick

Above the pipe laterals is placed a continuous blanket of glass fiber material 2 in. thick. This material acts not merely to prevent back radiation losses, but controls the acoustical absorption of the room.

Noise reduction coefficients of 90 may be obtained by installing blankets 3 in. thick above the piping. The aluminum panels were then clipped onto the laterals to complete the installation.

Panels Provide for Expansion

The special design of the panels provides a close contact between the laterals and the panels, permitting the heat from the laterals to flow efficiently by conduction into the radiating ceiling surface. Each panel is independently removable, providing instant access to the space above the ceiling at any point in the room.

The panels are finished with two coats of baked-on white enamel finish and are washable. The back side of the panel is shiny and unpainted, to reduce back radiation to a minimum. The edges of each panel are so formed as to allow for expansion and contraction of each individual pan.

There is little time lag in the system as the heat transfer from the steel piping direct to the aluminum panels is relatively high. The temperature of the water need not be limited; hence it is possible to achieve ceiling outputs in excess of 100 Btu per hr per sq ft of ceiling surface with pipes spaced 1 ft apart.

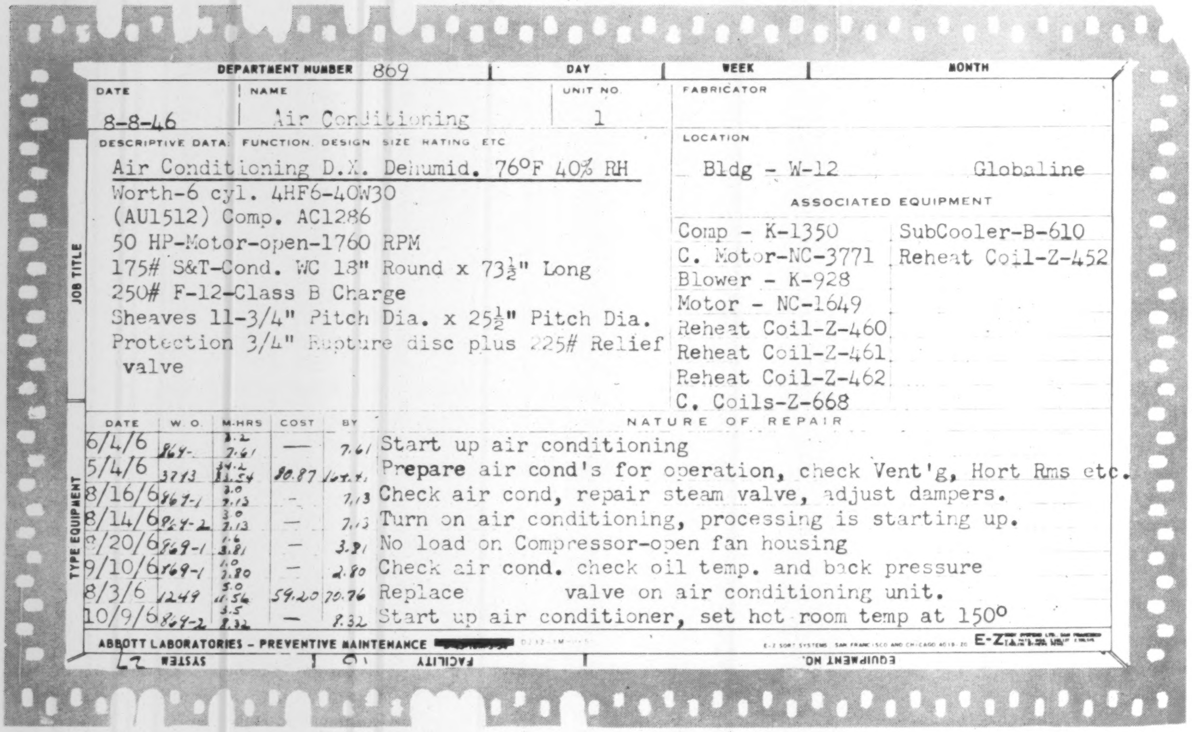
The architects were Eggers and Higgins. ⌗

Photos courtesy Burgess-Manning Co., Architectural Products Div.

Where air conditioning system efficiency is a must . . .

You Can Cut Maintenance Labor With Punch Card Record System

. . . that guards against downtime by anticipating needs of equipment before repairs become necessary. Here's how air conditioning maintenance, a critical factor in pharmaceutical manufacturing, is controlled at Abbott Laboratories. General aspects of this program were discussed in the February HPAC. Here is a closer look at the cards themselves, with a brief but detailed explanation of how they are used, by W. B. Bushnell, Abbott maintenance engineer.



DEPARTMENT NUMBER 869 **DAY** **WEEK** **MONTH**

DATE 8-8-46
NAME Air Conditioning
UNIT NO. 1
FABRICATOR

JOB TITLE

DESCRIPTIVE DATA: FUNCTION, DESIGN, SIZE, RATING, ETC.
Air Conditioning D.X. Dehumid. 76°F 40% RH
Worth-6 cyl. 4HF6-40W30
(AU1512) Comp. AC1286
50 HP-Motor-open-1760 RPM
175# S&T-Cond. WC 18" Round x 73½" Long
250# F-12-Class B Charge
Sheaves 11-3/4" Pitch Dia. x 25½" Pitch Dia.
Protection 3/4" Rupture disc plus 225# Relief valve

LOCATION
Bldg - W-12 Globaline

ASSOCIATED EQUIPMENT

Comp - K-1350	SubCooler-B-610
C. Motor-NC-3771	Reheat Coil-Z-452
Blower - K-928	
Motor - NC-1649	
Reheat Coil-Z-460	
Reheat Coil-Z-461	
Reheat Coil-Z-462	
C. Coils-Z-668	

TYPE EQUIPMENT

DATE	W. O.	M-HRS	COST	BY	NATURE OF REPAIR
6/4/6	869-	3.2 7.61	—	7.61	Start up air conditioning
5/4/6	3713	34.2 11.54	80.87	104.41	Prepare air cond's for operation, check Vent'g, Hort Rms etc.
8/16/6	869-1	3.0 7.13	—	7.13	Check air cond, repair steam valve, adjust dampers.
8/14/6	869-2	3.0 7.13	—	7.13	Turn on air conditioning, processing is starting up.
8/20/6	869-1	1.6 3.81	—	3.81	No load on Compressor-open fan housing
9/10/6	869-1	1.0 2.80	—	2.80	Check air cond. check oil temp. and back pressure
8/3/6	1249	5.0 11.56	59.20	70.76	Replace valve on air conditioning unit.
10/9/6	869-2	3.5 8.32	—	8.32	Start up air conditioner, set hot room temp at 150°

ABBOTT LABORATORIES – PREVENTIVE MAINTENANCE [redacted]

E-Z SORT SYSTEMS SAN FRANCISCO AND CHICAGO 4019-20 E-Z

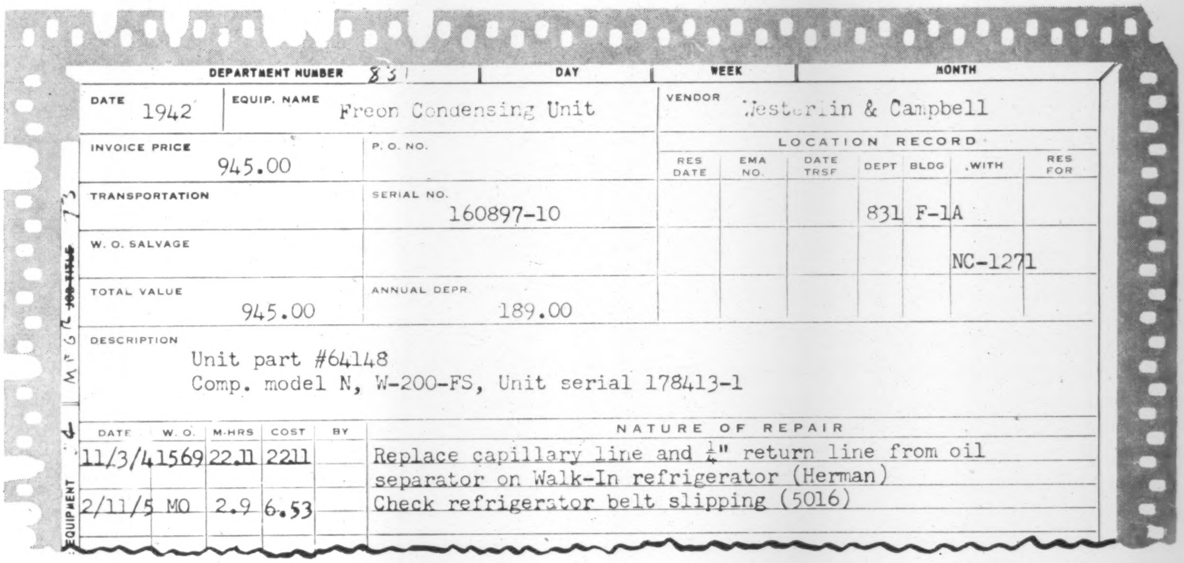
SYSTEM 27 **FACILITY** **EQUIPMENT NO.**

SYSTEM CARD — installation record of a system — lists all equipment associated with a particular installation. It gives descriptive information of design condition (not shown here) and other data. This card shows the location of installation, its name, who made the installation, and the date installed.

The edge punches show the department charge, facility and system numbers, key equipment number, type of installation — air conditioning, refrigeration, dust collection, dehumidification, and so on — and suggested schedule of preventive maintenance.

This card is used primarily for posting of maintenance costs not directly applicable to any piece of equipment, i.e., valve, trap, ductwork, painting, cleaning, piping maintenance, and so forth. Cost comparisons of systems are readily available by this method.

Budget accounts for coming years can easily be adjusted, based on the performance indicated on these cards.



DEPARTMENT NUMBER 831 | DAY | WEEK | MONTH

DATE 1942 EQUIP. NAME Freon Condensing Unit

VENDOR Westerlin & Campbell

INVOICE PRICE 945.00

P. O. NO.

TRANSPORTATION

SERIAL NO. 160897-10

W. O. SALVAGE

TOTAL VALUE 945.00

ANNUAL DEPR. 189.00

LOCATION RECORD

RES DATE	EMA NO.	DATE TRSF	DEPT	BLDG	WITH	RES FOR
			831	F-1A		
					NC-1271	

DESCRIPTION

Unit part #64148

Comp. model N, W-200-FS, Unit serial 178413-1

DATE	W. O.	M-HRS	COST	BY	NATURE OF REPAIR
11/3/4	1569	22.11	2211		Replace capillary line and $\frac{1}{4}$" return line from oil separator on Walk-In refrigerator (Herman)
2/11/5	MO	2.9	6.53		Check refrigerator belt slipping (5016)

EQUIPMENT

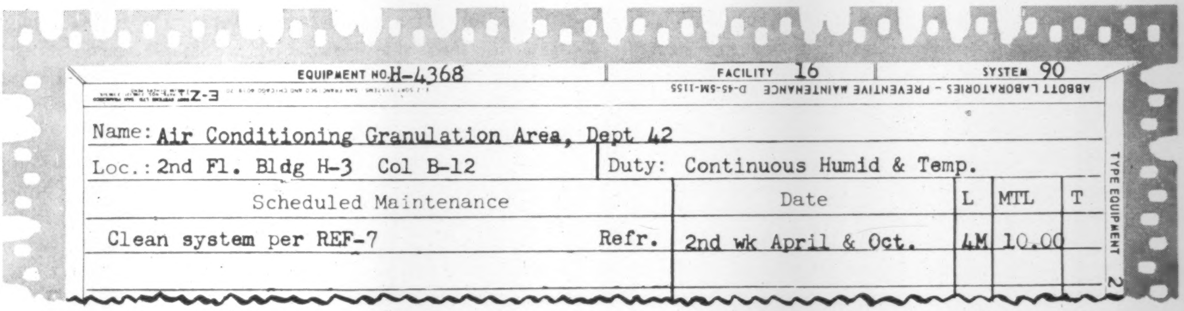
~~JOB TITLE~~ 73 M F 6

EQUIPMENT CARD is kept for each piece of equipment. Repair and overhaul costs on the particular piece of equipment are posted to its equipment card. A performance record of each piece of equipment is thus accumulated, and comparisons of each manufacturer's product can readily be made.

The punches along the sides are coded to indicate a particular manufacturer.

The card gives descriptive data, vendor, cost, depreciation, purchase date, and location record.

Budget figures can be adjusted easily by the use of the costs recorded on this card.



EQUIPMENT NO. H-4368 | FACILITY 16 | SYSTEM 90

E-Z

ABBOTT LABORATORIES - PREVENTIVE MAINTENANCE D-45-5M-1155

Name: Air Conditioning Granulation Area, Dept 42

Loc.: 2nd Fl. Bldg H-3 Col B-12 Duty: Continuous Humid & Temp.

Scheduled Maintenance		Date	L	MTL	T
Clean system per REF-7	Refr.	2nd wk April & Oct.	4M	10.00	

TYPE EQUIPMENT 2

MAINTENANCE CARD provides space for recording scheduled maintenance work, its frequency and estimated cost. Particular trades required are also entered.

Job instructions are written out fully for either complete systems or individual pieces of equipment as desired.

In cases where many pieces of identical equipment are used in the plant, a job instruction sheet is written and its code number given on the card in lieu of the full instruction. A copy of the job instruction sheet is then added to a personal instruction manual of each tradesman concerned.

On installations requiring periodic overhauls before breakdown, inspections are scheduled one month before the desired overhaul period. This gives the engineer the necessary time to schedule the shutdown with the production department, check spare parts inventory, and place orders accordingly, and arrange for the necessary labor and equipment required to perform the overhaul.

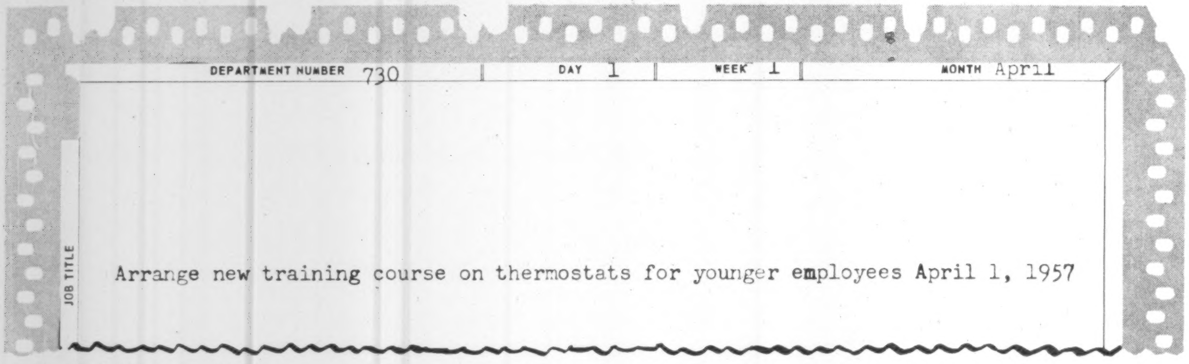
Overhaul instructions may be written on the cards, or contained in the workman's instruction manual and referred to on the schedule card. The choice depends on the engineer's judgment.

A graph is kept up to date on all scheduled labor on these cards so that the actual total number of manhours per week is known. This helps in determining the size of each trade group that is necessary and eliminates, to a degree, the possibility of overstaffing or understaffing any particular trade. Demands are reduced during the summer to permit vacation periods.

An office clerk sorts the cards weekly by the use of needles which are inserted in the proper holes along the margin. Punchings permit the due cards to drop out. The clerk then prepares the work orders from the information provided on the cards. The cards may then be placed back in the deck at random.

The cards may be sorted by due date, department, equipment number, facility, and system, or by any other method set up around the edges of the edge punched card.

Continued from preceding page —



DEPARTMENT NUMBER 730
DAY 1
WEEK 1
MONTH April
JOB TITLE
Arrange new training course on thermostats for younger employees April 1, 1957

MISCELLANEOUS CARD may serve many purposes of special nature. Abbott uses it for those special jobs not associated with any facility or system, such as periodic changing of filters mounted in doors, installation of screens or storm windows, and so on.

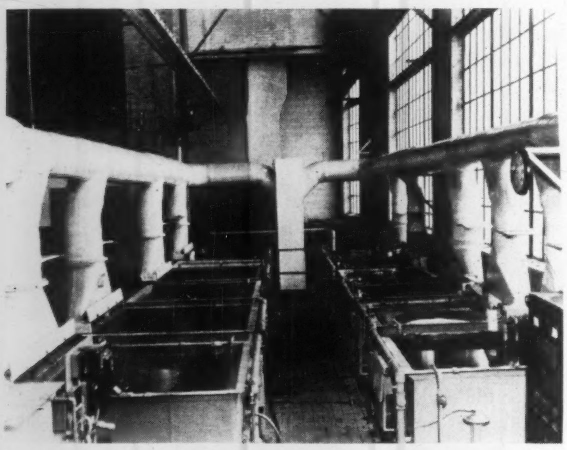
This card also serves as a memory jogger. There are many maintenance and other items which cannot be done immediately but should be done when weather or other conditions permit. A card can be made out describing the work, its edge punched for the future date desired, and placed in the deck. It will then drop out on the due date and work can be done at the proper time. ⌖

Polyester Ducts Solve Corrosive Fume Problem

THE PROBLEM of corrosive fumes has been successfully solved at the Coit Road plant of Thompson Products, Inc., Cleveland, according to Haveg Industries, Inc.

The solution: a corrosion resistant glass reinforced polyester duct and hood system installed some months ago in the plant's plating, pickling, and etching department. The system combats corrosive conditions quite typical of general plating room applications involving mild acid vapors, plus water and steam.

The pickles include straight nitric acid at about 35 percent solution, a nitric hydrofluoric of a 30 percent nitric, and 2 percent hydrofluoric acid. Some parts are cadmium plated, others are chrome plated, and others are pickled and etched. Some parts are titanium alloys.



FUME HOODS and all ductwork, of polyester glass, were installed and connected to the fume scrubber before any acid was added to the tanks

All of these plating operations require different processing and demand 12 different tanks.

Objectionable fumes occurred during the initial loading of the tanks due to excessive drafts and again during weekend shutdowns when the scrubber was turned off. These stray acid fumes caused corrosion of machine tools and parts in the area immediately surrounding the tanks. The excessive drafts were eliminated, and the system and scrubber are now operated on a 24 hr a day, 7 day a week basis.

The fume duct system operates on a push-pull basis. Pipes 3 in. in diameter in the front of all the tanks have been drilled out with $\frac{1}{4}$ in. holes. From these holes, air is blasted over the surface of the tanks directly toward the fume hoods, thus reducing the fan load in the chamber above the washer.

The ducts carrying fumes from the hoods are 12 in. and enlarge to 18 in. at the outer end of the system before they join the final 24 in. duct feeding into the fume scrubber chamber. The scrubber operates with a series of jet water sprays to extract the acids from the air, which is then exhausted over the roof of the plant.

Polyvinyl chloride ducts run from the fume scrubber and fan. The discharge chamber, connecting duct, and stack are of polyester glass. The plating and acid tanks are of polyvinyl chloride lined steel. Fume hoods and all ductwork are of polyester glass.

Full time operation of the fume removal system has completely eliminated the corrosion of machine tools and parts under fabrication in the plant, regardless of weather conditions. And with the fume scrubber connected as part of the installation, no objectionable or dangerous fumes are discharged to the atmosphere. ⌖

The Law and Your Profits

BY WILLIAM HURD HILLYER

Make Sure Bid-Taker is Authorized

ONE MUST be very careful to distinguish between a person who is authorized to award contracts and one whose authority is limited to merely receiving and discussing bids. The fact that a person *implies* he can award contracts is not sufficient, as one firm learned to its sorrow.

Pypet & Ayer were heating, piping, and air conditioning contractors. In June the general contracting firm of Masta Mayson & Sons, preparing to submit an overall contract bid for a gymnasium and swimming pool at Abbeyhill college, advertised for subcontract bids on portions of the work.

To that end the firm sent Mr. A. Proximat, its skilled estimator, to Abbeyhill. He was instructed to receive subcontract bids for portions of the work, including the heating, piping, and air conditioning.

On July 2, the specified day, various subcontractors, including Pypet & Ayer, submitted sealed bids for the job or portions thereof, and placed them in the bid depositary.

Pypet & Ayer's bids were as follows: heating and air conditioning, $137,320; piping, $149,800; combined heating, piping, and air conditioning, $283,000.

The firm's combined bid was the lowest submitted, as was its separate bid for the heating and air conditioning. However, the separate bid for the piping was $1800 higher than another bidder's.

The depositary's rules provided that subcontractors must submit separate bids for heating and air conditioning and for piping. A combination figure for both items could be reduced by not more than 5 percent of the total. All bids, except that for heating and air conditioning, when conveyed to the general contractor should provide that such bid could be used only with another "piping, or heating, or air conditioning" bid which had been submitted conformable to these rules.

Later that day, after all bids had been opened, Peter Pypet, senior partner of Pypet & Ayer, phoned the Abbeyhill office of Masta Mayson & Sons to convey them his bid. Estimator Proximat answered the phone. The conversation went like this:

Pypet: Is Mr. Mayson there?

Proximat: No, but I'll take the bids.

Pypet: Are you authorized?

Proximat: Yes.

Pypet: Do you understand the rules that if I am low in the bid box I am to get the bid?

Proximat: Yes.

Pypet: Well, there's no reason to break it down, because there's no heating or piping bid in a combination that would beat my bid of $283,000. You understand that I have the low bid and it's my job?

Proximat: I understand thoroughly, but could you let me have a breakdown anyway?

Pypet: Well, it's $137,320 for the heating, etc., and $149,800 for the piping. But on the combination I took off $4000 that I considered I could save by doing both jobs. Do you understand that you are not to use either of the bids contrary to the rules?

Proximat: Yes.

The general contract was awarded to Masta Mayson & Sons, who, in turn, entered into a subcontract with Pypet & Ayer for the heating and air conditioning portion of the work.

At the same time it entered into a similar contract with Pypet's competitor for the piping.

Pypet & Ayer sued Masta Mayson & Sons for damages for not giving them the whole combination.

In court Pypet contended that his telephone conversation with Proximat gave rise to an oral contract between the two firms. By virtue of such agreement the general contractor was to award the subcontractor the heating, piping, and air conditioning job in the event Pypet's bid submitted to the Mayson firm was the lowest bid, according to Pypet.

Proximat testified that in his capacity as estimator he did not make subcontracts and had never represented to any contractor on behalf of Mayson & Sons that his bid would be used if it were low in the bid depositary.

He swore that throughout his dealings with subcontractors in his capacity of estimator he merely received bids and discussed jobs.

The court awarded a judgment in favor of Pypet.

Mayson appealed.

The higher court reversed the judgment, having dwelt at length upon the detailed testimony of one of the Mayson sons to the effect that none of the employees of his firm were authorized to enter into any subcontract on a public bid and that Proximat was not so authorized.

"There is a distinction between receiving bids and awarding contracts," the court maintained. ╪

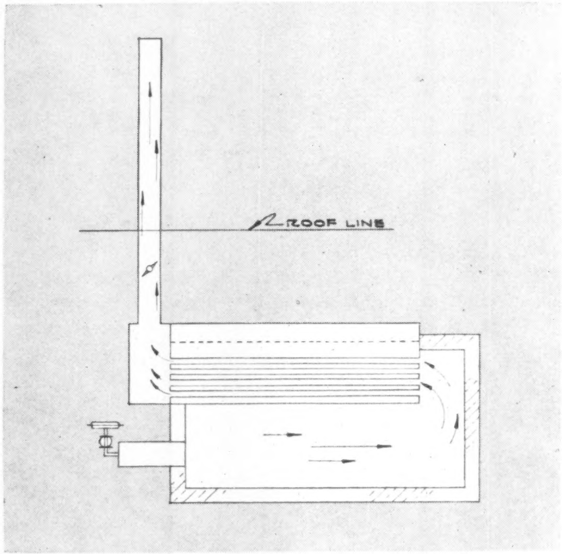
WILLIAM HURD HILLYER, *author of this regular feature, is a contributor to a number of banking and financial publications and has written several books on business. He has an extensive practical legal and financial background.*

This series presents actual cases. Naturally, laws vary in different states. All names are fictitious.

Pressurized Firing:

Reports from the field have shown a real need to clarify the subject of applying pressurized firing systems in the large building field. This article discusses the fundamentals involved.

BY ROBERT W. PIXLER
Vice President
The Mettler Co.



1 NATURAL DRAFT FIRING requires a stack of sufficient height to create enough differential to overcome pressure drop through the boiler, plus enough to induce air through combustion air openings in sufficient quantities to provide a fuel-air ratio for combustion. Method is common for low or high pressure, horizontal, single pass, fire tube, externally fired boiler

MANY TIMES heating and air conditioning engineers and contractors are puzzled by the need for choice between the pressurized firing system and one employing natural or forced draft.

A number of factors must be considered carefully in making this choice, in order to give the user of the equipment an optimum system at lowest overall cost.

A review of the basic characteristics of the systems and clarification of terms is in order before analyzing the factors to consider in selecting a pressurized firing system.

In general, there are three methods of introducing air to the fuel to be burned in steam boilers, high temperature oil heaters, and vaporizers:

1) *Natural draft* uses a stack of sufficient height to create differential to overcome the pressure drop through the boiler, plus enough to induce air through combustion air openings in sufficient quantities to provide the proper fuel-air ratio for combustion.

2) *Forced draft firing* has a fan installed on the inlet to the burner. For this discussion we will refer to this particular type of firing as using a forced draft fan of sufficient size to provide 100 percent of the combustion air, but not to have either pressure or volume capacity enough to further overcome pressure drop through the boiler. This results in a combination of a forced draft burner firing unit in conjunction with either a stack of sufficient height and capacity to overcome pressure drop through the boiler, or the use of an induced draft fan for this same purpose.

3) *Pressurized firing system* has all the characteristics of system No. 2, that is, forced draft firing with one exception. This system has a burner firing unit with a fan of sufficient size and volume to provide 100 percent of combustion air, plus enough pressure capacity to overcome the pressure drop through the boiler. As a result, the stack becomes nothing more than a breeching for handling the flue gases out of the room.

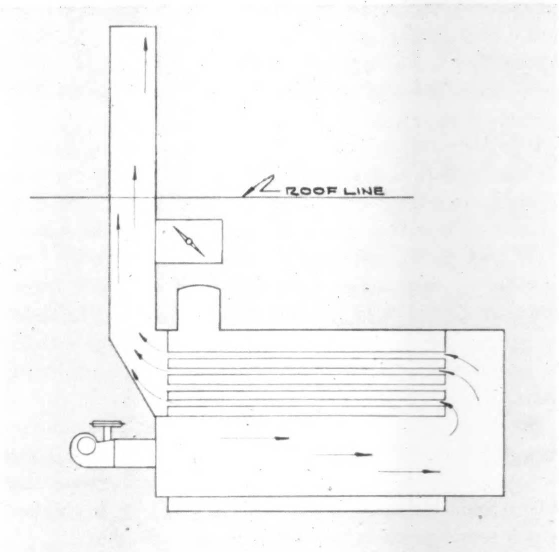
Natural Draft Needed Minimum Pressure Loss

Many years ago, when the only type of fuel available was solid fuel, it was necessary to have sufficient natural draft for liberating the combustion products without the use of forced or induced draft fans. Under average atmospheric conditions the stack produces very little draft, so it was necessary to design the boilers with a minimum pressure drop or draft loss through the heat transfer surfaces.

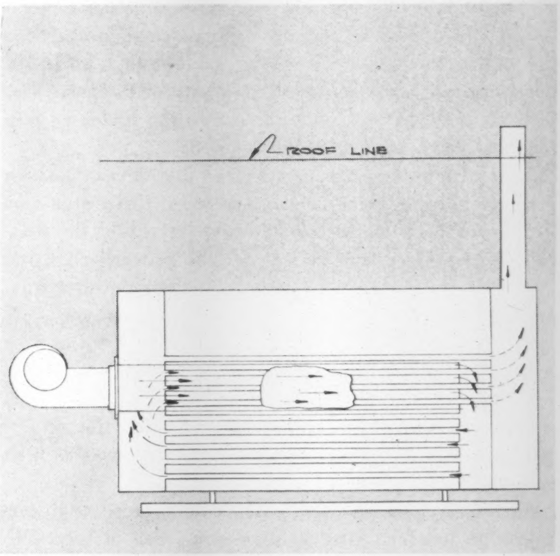
For example, a stack 50 ft high at 70 F outside tem-

A previous article by the author, How To Convert Boilers to Gas-Oil Firing, was published in two parts, in the February and March 1955 HPAC's.

When, Where, How Do We Use It?



2 FORCED DRAFT FIRING utilizes a fan on the inlet to the burner to provide 100 percent of the combustion air and, frequently, an induced draft fan to overcome pressure drop through the boiler if stack is not sufficient in height or capacity for this purpose. Method is common for low or high pressure, horizontal, two pass, fire tube, internally fired boiler



3 PRESSURIZED FIRING utilizes a burner firing unit with a fan of sufficient size and volume to provide 100 percent of combustion air, plus enough pressure capacity to overcome pressure drop through the boiler. Induced draft fan is not needed. Method was developed for packaged boilers of low or high pressure, horizontal, three pass, internally fired type

perature and 500 F flue gas temperature will produce a draft of 0.25 in. water gage. A stack 100 ft high will produce a draft of only 0.5 in. W. G. Because of this, the pressure drop through the boiler had to be held to a minimum, and 3 in. tubes were commonly used in the return sections of these boilers for this reason. The ratio of heating surface to develop horsepower was generally kept at about 10 sq ft per hp, in order to maintain reasonable stack temperatures. However, the use of large diameter tubes resulted in the passage of a hot core of gases through the boiler at efficiencies anywhere from 40 to 65 percent.

Overfiring Increased Efficiencies

After gaseous and liquid fuels became more available, a practice developed of "overfiring" these units at approximately 150 to 200 percent of rating. In these applications, especially after the advent of forced draft firing, it was necessary only to overcome the pressure drop through the boiler, which normally was no more than 0.1 in. W. G. plus 0.02 to 0.04 in. W. G. negative pressure in the combustion chamber. This meant a reduction in the size of stack required, but it was still necessary to use either a stack or an induced draft fan. Increasing the velocity of the gases through the return tubes increased the heat transfer rate because of greater turbulence. Also, the increased turbulence resulted in a reduction of the so-called hot core through the tubes. Because the amount of excess air necessary to burn the fuel was reduced so greatly, efficiencies increased appreciably.

Efficiency here refers to overall boiler efficiency, and not merely thermal efficiency. Varying with the application and type of unit, it was possible to achieve efficiencies as high as 75 to 80 percent. It is always desirable to have a draft control in order to regulate the overfire draft at all rates of firing, holding the overfire draft at least neutral and preferably at 0.02 to 0.04 in. W. G.

Develop and Improve Packaged Boiler

These methods were in common use from 1900 to about 1940. However, with the beginning of World War II, the U. S. Armed Forces presented specialized problems of application which needed solution. Mobile water heaters and steam boiler units were needed for use in such applications as water distillation which would be less bulky, lighter in weight for portability, and independent of a stack.

Industry responded with the "packaged" boiler, which had been reduced in physical size, while it retained its heat output ability. It was lighter in weight and had a burner firing unit capable of firing the unit without the use of a stack. The burner pressurized firing unit produced the necessary volume and pressure of combustion air to overcome the pressure drop or draft loss through the boiler unit.

Immediately after the end of World War II it was recognized that this type of unit had definite commercial possibilities and a number of them reached the market. The size of the return tubes was reduced to 1 in. in diameter, in order to increase the velocity of the gases and to pack as much heating surface into the boiler as possible under the size limitations imposed.

A new development appeared at this time when, in order to get sufficient heating surfaces, three and four passes were introduced, all of which increased the pressure drop through the boiler and the pressurized firing unit. The ratio of heating surface to horsepower output went from about 10 sq ft per hp to an extreme of 2 1/3 sq ft per hp. The firing rates per volume of firing tube or combustion space available had been from 30,000 to 50,000 Btu per cu ft, this was now increased to as much as 250,000 Btu per cu ft. In some specialized forced circulation water tube flash boiler designs, this was as high as 1 million Btu per cu ft.

As this cycle progressed, competition forced engineering to go too far. After a disasterous rash of tube failures, tube bagging, and split fire tubes, the cycle swung back to designs having about 100,000 Btu per cu ft of combustion space, and with a heating surface per boiler horsepower output of about 4 to 5 sq ft.

Multipass units ranging from the conventional two-pass through the three-pass and four-pass units brought on rather high pressure drops through the boiler unit from 0.4 to 0.5 in. W. G. It was mandatory that the boiler firing unit be tightly sealed because the leakage of combustion gases at exposed points in the boiler would result in overheating.

Also, the boiler-burner unit had to be completely sealed to resist overheating because of back pressure at the firing point. Most of these units were designed to operate without any stack or stack effect, and they could be fired while not connected to any stack.

Advantages, Disadvantages of Pressurized Firing

What are the benefits and disadvantages of this type of firing? First, it is a unit which is not dependent on a stack to create draft. Because, as in the forced draft firing unit, pressurized firing requires handling all the air for combustion through the burner, it is possible to control the ratio of combustion air to fuel mixture which results in high thermal efficiencies. Because the unit operates under positive pressure conditions in the combustion chamber, it eliminates the possibility of air infiltration into the boiler setting which reduces the amount of excess air in the mixture and flue gases.

Because the loading of flue gases in the stack is high, the breeching size and stack diameter can be reduced.

One disadvantage is that we find it is now necessary to construct the boiler to have it positively sealed to handle the positive pressure in the firing passes. This increases the cost which, on the average, not considering the burner equipment, will cost from 10 to 20 percent more than a unit which is forced draft fired. It is now necessary to build a burner unit with power requirements sufficient to handle existing back pressures. On a typical unit which is changed from forced draft firing to pressurized firing, an increase from ½ to 3 hp is necessary. Every hour the unit operates, the customer pays for this additional power.

It is more difficult to build a pressurized firing burner. Many factors are involved, all of which lead to greater difficulty in adjustments of fuel-air mixture, and the ability to maintain this over a period of time. In the laboratory, and under specialized test conditions, it may be possible to demonstrate extremely high efficiency levels. However, in the field, this efficiency is reduced in order to gain reliability and to eliminate troublesome maintenance and adjustment under day-to-day operating conditions.

We have now raised the horsepower and pressure factors, and the noise problem enters the picture. This can be quite serious in some cases. The initial cost of the boiler and the firing equipment is going to be higher, which tends to offset savings in stack reduction.

Another factor is the fact that pressure firing a unit means pressurizing the setting, and the breeching, and eventually the stack. Should there be any mechanical leaks in the structure, flue gases can be admitted into the atmosphere of the building in which the unit is fired. This, of course, can be very serious.

Another disadvantage of the pressurized firing unit is the fact that because the unit is so tightly sealed, in the event of a combustion explosion in the firing unit, serious damage results in the unit itself. Also, a realistic appraisal indicates that more maintenance is required in day-to-day and year-to-year operation of the pressurized firing unit.

Favor Forced Draft in Most Cases

Forced draft firing accomplishes the same results that are achieved with pressurized firing, except under certain special conditions. All combustion air is handled through the burner and can be easily and accurately controlled. Only a nominal stack is required. Horsepower requirements are low, maintenance is low, and the noise level is low.

It should be noted that pressurized firing is not a cure-all. While it has definite advantages under some circumstances, it should not be used indiscriminately. Many times pressurized firing units are recommended, even though there will be, by architectural necessity, a stack of sufficient height and capacity available. This penalizes the user because he must buy equipment which is really not required. When a problem arises of selecting pressurized firing as against another type, it is wise to weigh and evaluate all the benefits and disadvantages and apply them and then decide which type of unit should be used. ⌗

Glass Encased Sun Screen Reduces Heat Gain

. . . cuts air conditioning load, as shown in before and after tests of solar radiation in modern office building

GLASS ENCASED LOUVERS of Los Angeles' Standard Federal Savings building reduce the effect of the sun's energy by 82 percent

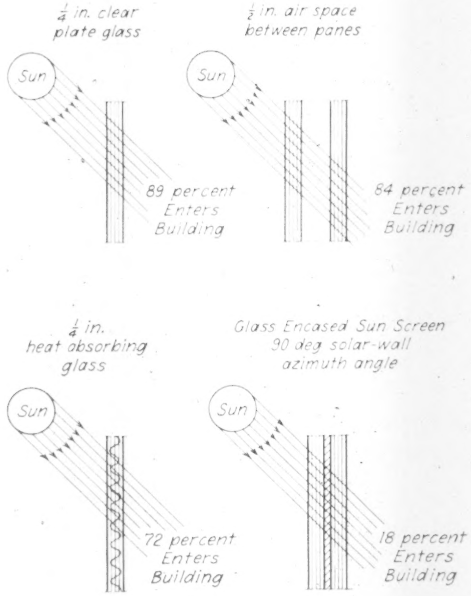
HUNDREDS of tiny horizontal louvers encased in glass minimize the air conditioning load and more than repay its cost in initial tonnage alone.

A study by Technical Service Research, Inc., of the effects of direct solar radiation on air conditioning loads was conducted in the Standard Federal Savings building, Los Angeles, Calif. The glass encased louvers were tested against standard windows and heat absorbing windows to determine the most efficient means for reducing solar energy entry into the building.

The research report points out that clear glass windows allow 89 percent of the sun's energy to enter.

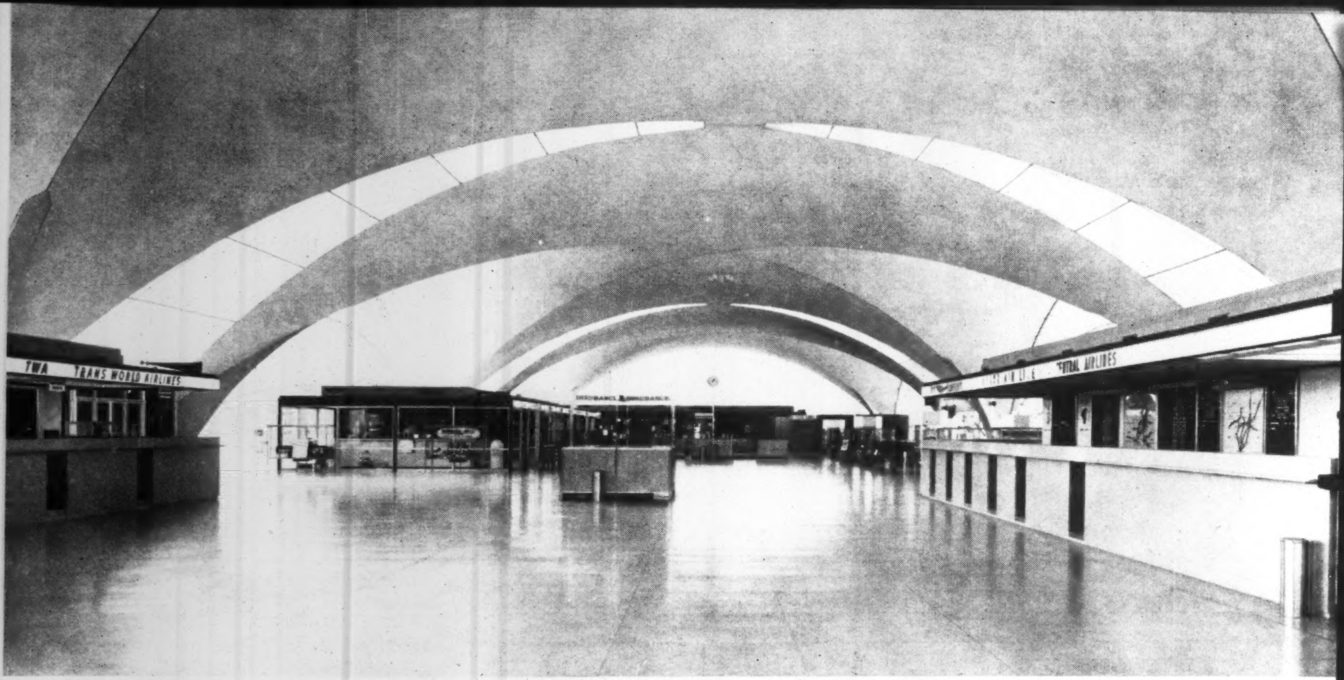
The addition of another glass pane with an air space in between reduced the energy gain by only 5 percent. Heat absorbing glass ¼ in. thick allowed 72 percent of the sun's energy to enter. Glass encased louvers, permanently angled to screen out the maximum amount of solar radiation, allowed only 18 percent to enter the building. ‡

Photos courtesy Koolshade Div., Reflectal Corp.


¼ in. clear plate glass
Sun
89 percent Enters Building
½ in. air space between panes
Sun
84 percent Enters Building
¼ in. heat absorbing glass
Sun
72 percent Enters Building
Glass Encased Sun Screen 90 deg solar-wall azimuth angle
Sun
18 percent Enters Building

◀ SOLAR HEAT GAIN through various types of window treatment ranges from 18 to 89 percent, as shown here

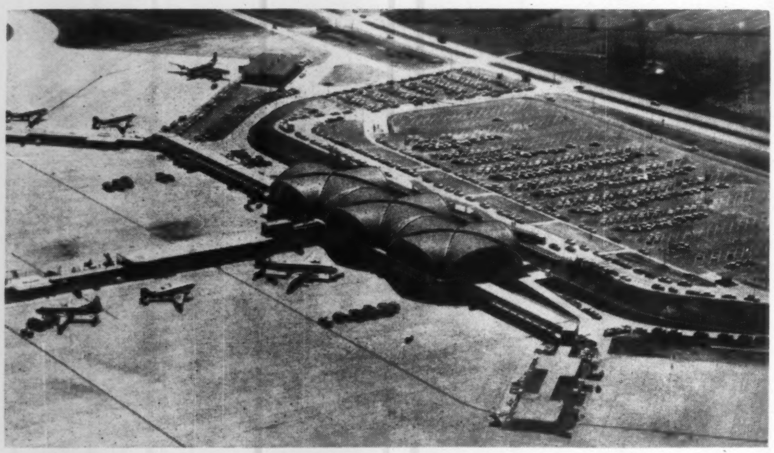
SOLAR HEAT GAIN ▶ through windows of Los Angeles County Engineers' building was 1,102,000 Btu per hr even with venetian blinds tightly closed. With solar screening heat transmission dropped to 234,000 Btu per hr



PASSENGER LEVEL with air supply diffusers above ticket offices and with curb outlets in each perimeter zone represent some of the problem solving ideas for . . .

. . . Heating, Cooling New Air Terminal

. . . at Lambert Field, St. Louis. To serve the five separate air conditioning systems, two 500 hp package boilers provide steam and two 500 ton compressors provide chilled water. Design of heating and air conditioning systems includes plans for expansion when additional fingers are built.



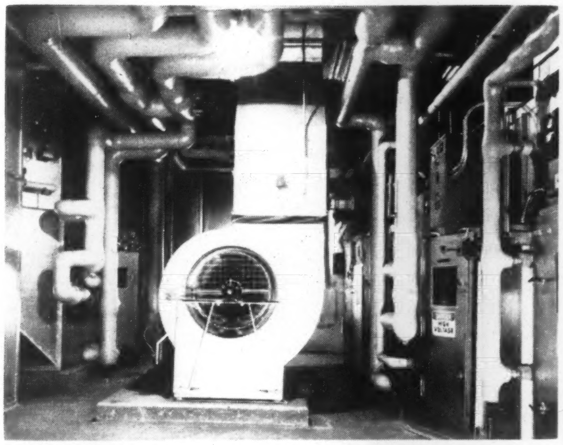
VAULT TYPE ROOF prevented use of ceiling ducts. Finger extensions to plane positions have equipment rooms to facilitate plane heating and cooling

BY LOUIS L. HAMIG
Ferris & Hamig
Consulting Engineers

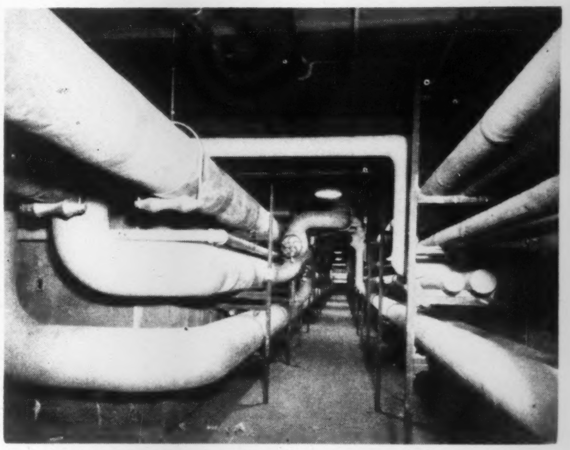
THE OFFICIAL DEDICATION of the new air terminal building at Lambert Field, St. Louis, Mo., was the culmination of three and one-half years' work of design and construction.

Ended were the many long conferences in which overall issues and detailed items were hashed and rehashed before common agreement was achieved. Some of the troublesome problems involved: the location of the refrigeration plant and boiler room; the type of air conditioning systems; preserving the clean unobstructed view in the passenger level; and methods of airplane heating and cooling.

The new terminal building has won worldwide acclaim for its originality of design. The upper or passenger level is 415 ft long and 120 ft wide, with no interior supports. Each section is comprised of four barrel vaults intersecting 32 ft above



RETURN AIR FAN serving each of five air conditioning systems automatically exhausts and recirculates varying proportions of air, according to outside temperature



MAIN PIPE TUNNEL and branches from boiler building to ends of fingers contain all steam, condensate piping, condensate pump discharge lines, water and air piping

the floor. With walls entirely of glass, an unobstructed view is obtained of the field and surrounding areas.

The passenger level is devoted to ticketing, concessions, waiting room, and dining area. The finger or intermediate level has a waiting room, toilet facilities, offices, baggage room, and truck concourse. The apron or lower level provides space for the main kitchen, equipment rooms, airline operations, air freight, and post office. Extending from the building are three fingers to serve 16 present plane positions. The building is designed so that one additional section can be added on the west and two sections added on the east, doubling its present size. The fingers are designed for 24 additional plane positions. Plans are already being made to air condition all future fingers which were not planned originally.

Can Add Boiler, Compressor

Two 500 hp package boilers and two 500 ton compressors were installed for steam and water chilling. A future boiler and compressor will be installed when the fifth section is completed. The present plant has sufficient capacity for the addition of one more section. The cooling tower, condensing water pumps, and chilled water pumps are sized for the future.

One bank of water heaters furnishes hot water for the kitchen and another bank for the toilet facilities. All cold water, hot water, and steam used for the kitchen are separately metered.

Central Control Panel in Office

A central control board in the plant engineer's office records steam flow and pressure, chilled water flow and temperature, condensing water flow and temperature, domestic hot water temperature, and outside temperature. Pushbuttons with pilot lights are also installed on this board for remotely operating all pumps and fans that are a part of, or pertain to, the heating and air conditioning.

To keep the temperature of the boiler building as low as possible in the summer, roof ventilators are installed above the pumps and boilers. Exhaust fans draw air through the 500 hp wound rotor compressor motors and then through the grids, thus exhausting the major heat directly outdoors.

The 500 hp compressor motors are operated at 4160 volts. All other three phase motors in the boiler building are designed for 440 volts.

A main tunnel extends from the boiler building to the end of the east finger a distance of 1700 ft, with branch tunnels to the west finger and center finger. All steam, condensate pipe lines, condensate pump discharge lines, hot and cold water lines, air lines, and chilled water lines are distributed through these tunnels to the equipment in the terminal building and fingers.

How Building Is Zoned

Five air conditioning systems are installed for the entire terminal building. One system serves each of the three sections for the passenger level. One serves the lobby of the finger or intermediate level, and one serves the offices on the apron and finger level.

Each system for the three sections and the system for the offices is zoned for exposure and interior area. Due to the vault construction, overhead ducts were impossible, and each exposure was zoned with supply outlets installed in a curb at the exterior to compensate for outside temperature and varying sun load.

The interior area is supplied air from ducts above the ticket offices, concessions, and kitchen. The ticket offices and concessions are also separately zoned with the air being introduced at the edges of the corrugated plastic ceiling.

Due to the low ceiling height in these areas it was necessary to provide an overall luminous ceiling and very low velocity air distribution.

Each air conditioning system has

a return air fan so that air can be returned to the unit or exhausted. The proportion of return and outside air can thus be automatically varied, depending upon the outside temperature. A saving in refrigeration or compressor operation can be effected when the outside temperature is lower than the inside temperature. Due to the high occupancy and large amount of outside air, each zone of the unit for the dining area is provided with reheat so that a maximum relative humidity of 50 percent can be maintained.

Use Electric Snow Melting

Baggage ramps from the apron level to the baggage department on the finger level have electric snow melting.

Electricity was used due to the ease of installation and maintenance.

Steam, Hot Water Heat Fingers

The east, center, and west fingers provide access to the 16 plane positions, with provision for 10 future positions. Escalators provide vertical transportation between the finger, or intermediate level, and apron level.

The upper levels of the fingers are heated with hot water convectors from three heat exchangers in the terminal building. The apron levels of the fingers are heated with steam convectors connected to the steam lines in the tunnel below.

Each finger has an underground equipment room for a condensate pump, sewage pump, and electric unit substation. Air is introduced into the tunnel at these points for ventilation and is exhausted in the boiler building.

An equipment room for each plane position is provided in the fingers for plane air conditioning. The criterion for air conditioning large passenger planes is 2000 cfm of outside air at 12 in. static pressure at the end of 35 ft of 10 in. diam flexible hose, with temperatures at that point of 48 F for cooling and 138 F for heating. Reduced air volumes for smaller planes are accomplished with an automatic damper in the fan suction.

Each system was designed for 20 in. total static pressure and 35 F off the cooling coils. This low temperature was necessary to compensate for the temperature rise in the fan and ducts.

Chilled water coils, through which 40 F water from the refrigeration plant is circulated, reduces the air temperature to 48 F. A direct expansion system using the chilled water leaving the coil for condensing purposes reduces the air to 35 F.

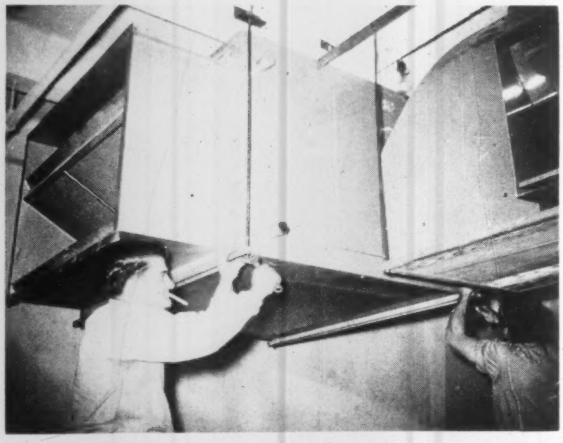
Hellmuth, Yamasaki & Leinweber were the architects. ‡

Solve Snags to Air Condition Nurses' Home

. . . provide 24 hr a day optional heating or cooling

SEVERAL knotty application snags faced designers and installers alike on the air conditioning system for a new nurses' residence addition to Los Angeles County hospital, according to Drayer Hanson, a Div. of National-U.S. Radiator Corp.

Required 24 hr a day was optional heating or cooling in each room due to the 'round the clock schedule of nurses which dictated complete comfort for sleeping, lounging, and socializing. To do the job, individual, room by room, air conditioning equipment was selected.



CEILING MOUNTED heating and ventilating unit, shown during installation, furnishes controlled ventilation to luggage storage and maintenance areas

An extension to an existing residential building made it necessary to break through 12 in. of concrete to bring an outdoor air connection to each room unit.

All pneumatic controls for both heating and cooling are within the cabinet. The 40 console units each have a capacity of 7800 Btu per hr and each delivers 300 cfm of air.

Auxiliary heavy equipment consists of a 30 ton compressor from which chilled water is piped to individual room units, with the main boilers of the old building furnishing steam to a converter to provide hot water for the circulating system.

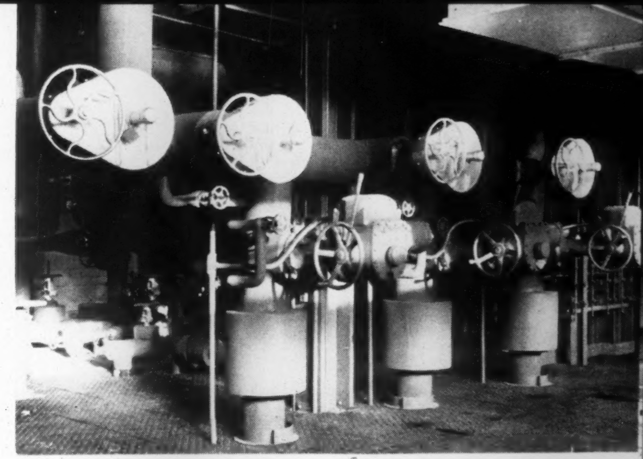
Also in the basement equipment room is a 1 hp hot water pump, a 3 hp chilled water pump, and a 2 hp condenser water pump.

Serving as a closed circuit cooling tower is an evaporative condenser built into its own enclosure, and set 4 ft above ground level as a separate building wing.

An air handling unit in one equipment room serving public space areas provides recreation halls with 6200 cfm of air. An exhaust unit operates in conjunction with it. Due to space limitations, the unit was split so that the air through the cooling coil flows horizontally and the air in the heating coil flows vertically. ‡

Piping "Trinkets"

. . . *facilitate valve operation*



1 COMMON VALVE INSTALLATION, while workable, represents the minimum of equipment. To operate valves, attendant must climb ladder or stairs to a catwalk

BY G. W. HAUCK
Manager, Engineering Sales
Crane Co.

THERE ARE HUNDREDS of common valve installations like the one shown in Fig. 1. A hand operated valve is installed well above the operating floor level. In order to operate such a valve the attendant must use a ladder, climb stairs to a catwalk, or the like. Of course, this is a workable installation. It suffices, even though it represents the minimum of equipment. However, a piping trinket offers an improvement.

The simple addition of a chain wheel and chain, as shown in Fig. 2, makes the hard to reach valve in another installation accessible. This permits operation from the floor, eliminates inconvenience, saves time, and promotes safety. If the valve is operated with any degree of frequency, the chain wheel operator is indeed a worthwhile piping trinket.

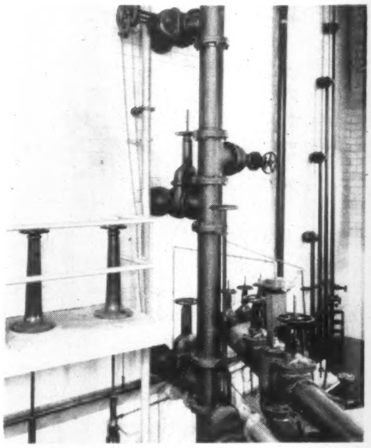
In other cases, extension stems can be applied to overhead valves, provided the service conditions make it feasible to install the valves in an upside down position. Extension stems are most effective in the relatively smaller sizes of valves.

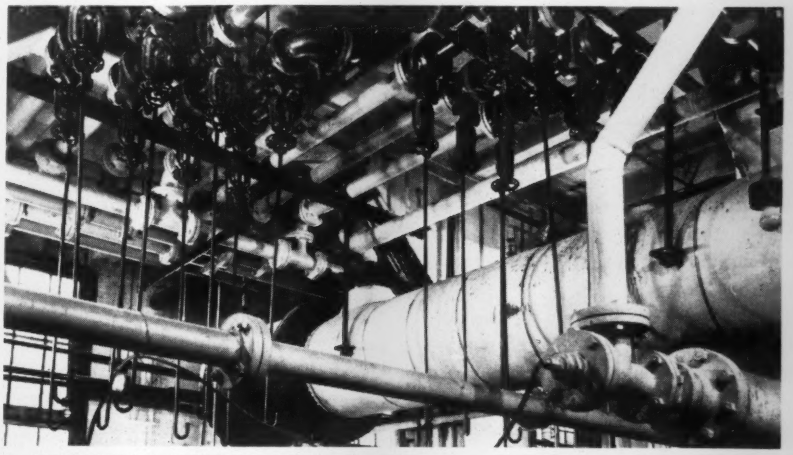
Perhaps the situation is reversed and the valves are below the operating floor level. Here the problem of lost time for operation may be solved two ways: (1) with an extension stem for a smaller valve; (2) with extension stems with floor stands for larger valves, as shown in Fig. 2.

There are, of course, other devices for operating valves in inaccessible locations, such as electric motor operators. ≠

The author is a member of HPAC's board of consulting and contributing editors and has prepared numerous piping articles for publication in HPAC.

More piping trinkets that are justified in good planning will be discussed and illustrated in future issues of HPAC. A previous article was in the September HPAC.





2 CHAIN WHEEL AND CHAIN, or extension stem and floor stand, permits operation from floor

3 EXTENSION STEMS for overhead valves are most effective in the smaller sizes. For valves below operator's level, useful accessories are stems for smaller valves and stems with floor stands for larger valves

AIR CURTAIN ENTRANCE consisting entirely of vertical layers of gently moving conditioned air permits unimpeded high volume of traffic at Bergner's department store in Sheridan Village shopping center, Peoria, Ill.

Air Curtain Entrances Grow Wider; Operation Becomes Automatic

. . . marking recent developments in the progress of this heating and air conditioning application

BY EDWARD E. GYGAX
Engineer
American Air Curtain Corp.

THE FIRST ARTICLE relating to the air curtain sealing of door openings for exterior entrances appeared in the January 1956 issue of HPAC. Since then several important developments have marked the progress of this method of heating and air conditioning. This progress is briefly outlined here.

The air curtain works on the following principle: A series of nozzles above the entrance discharges layers of air downward to an air return grille in the floor. The air is returned to the top nozzles through ductwork which contains filters, heating and cooling elements, and blowers. This moving curtain of air has sufficient depth to protect and insulate the store interior from outside temperature, dust, dirt, rain, snow, debris, insects, and unwanted animals. Persons passing through the air curtain feel a gentle breeze and a pleasant sensation of warmth in the winter and coolness in the summer.

The European method using a recirculating air system across an opening has brought an open age of merchandising and a stimulus for the imaginative architect and engineer. Using the directional air nozzles with variable air velocity discharges, has enabled the entrances to remain open under the majority of conditions.

To merchandisers, such advantages as providing an open invitation to customers, eliminating door accidents and traffic jams, increasing building cleanliness, and eliminating door maintenance are quite attractive.

One of the first problems in the introduction of any new idea or product is to prove satisfactory operation. The utilization of air seals was not a new concept, but its application to exterior entrances and the problem of variable pressures had never been completely successful. Thus, the development of a directional nozzle discharge was of great importance. Operations in Europe since 1952 provided the basis for this.

The original skepticism which the air curtain met from experienced engineers was no different from what we originally felt. The air curtain was not a "cure-all" for extreme pressures, but in its field it is providing successful solutions to troublesome problems. For example, it is no longer necessary for supermarket clerks to bundle up and still freeze while heavy traffic through doors prevents the doors from closing, thus creating drafts and serious heating problems. Even double sets of automatic doors did not solve these conditions. As one operator found, his clerks did not even have to stand on heating pads during zero weather, the usual requirement in other stores in the area.

EIGHTEEN FT WIDE ENTRANCE is sealed by warm or cool air curtain, controlled by a selector switch. Two centrifugal blowers, each of 18,000 cfm capacity, are driven by 10 hp variable speed motors

THE CHAS. V. WEISE CO.

BARRIERS REMOVED, installation in new Rockford, Ill., store is one of the first three air curtain entrances installed in American department stores. Equipment room is in basement

First Planned As Package Unit

The original Cincinnati supermarket installation discussed in the January 1956 HPAC has now gone through two winters with favorable operation. This and subsequent installation were each a stepping stone to wider and more attractive installations. Visits were generally made to existing installations under the varying conditions of pressures and temperatures before new installations were specified.

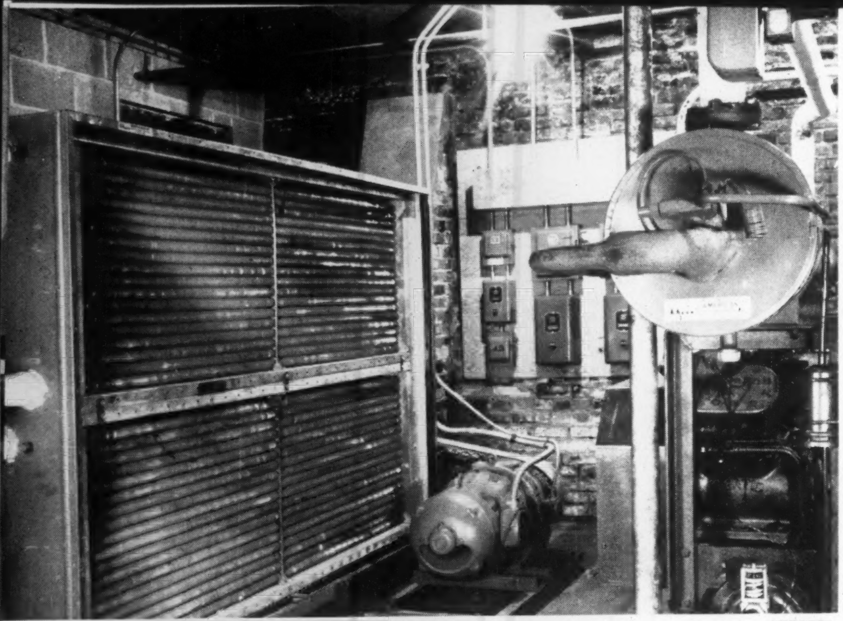
The Cincinnati supermarket installation was conceived as a "package" unit for simplicity of installation and economy. This was required for this type of building to provide a first cost installation approaching that of the generally used automatic carpet type doors. Most new supermarkets are designed without basements, and a return air plenum pit is poured at the same time as the foundation. Grating is placed over the pit, and two prefabricated air ducts are erected on each side. A box is then set on top of the two return air ducts forming a selfsupporting structure. Within the box are the blowers — three centrifugal wheels with scrolls mounted on a common shaft — driven by a variable speed motor, plus the air discharge nozzles. Heat is provided by using a gas fired duct heater on a bypass.

Depth Doubled in Second Job

A second installation was made in New York City in an existing supermarket. The design was similar, except the air curtain was double in depth. This entrance was 9 ft 6 in. wide and 20,000 cfm was delivered by four centrifugal fans. These fans were mounted in two sets with two wheels per shaft each driven by a 5 hp variable speed motor. Two gas fired duct heaters were used on a bypass arrangement. A sheet metal return air plenum — pit — was suspended from the floor.

Variety of Units in Operation

Quite a variety of units are in operation. One Chicago market installation uses the space to one side of



EQUIPMENT ROOM, for 12 ft wide air curtain entrance at Bergner's downtown store, Peoria, Ill., contains combination hot water heating and cold water coil and 10 ton water chiller

the entrance for the equipment. The return air plenum is extended below this side space and a floor mounted air handling unit is installed over the opening to the plenum. Air is drawn up through a filter section, hot water heating coil, fan section, and then through a duct to an extension of the air discharge plenum. Generally, such space is at a premium and it is desired to keep the space at either side of the entrance to a minimum. It is more desirable to locate equipment above or below an entrance and to use minimum size return air ducts or a single return air duct.

Presently there are two 18 ft wide entrances in department stores in shopping centers, one in the Bergner Sheridan Valley store, in Peoria, Ill. and one in the Charles V. Weise Co. North Town Plaza store, Rockford, Ill. These installations are similar and each has a pair of centrifugal fans, each with 18,000 cfm capacity, driven by a 10 hp variable speed motor.

The Bergner store is without a basement, but an equipment room on a basement level was provided. Heating of the curtain air is provided from a building hot water system to a bank of water coils.

The Weise store has a basement in which the equipment is installed. In this case, building steam is furnished to a heat exchanger which then furnishes hot water to a bank of coils. Each installation is equipped with a 15 ton water chiller which furnishes chilled water for cooling of the curtain air.

The heating and cooling is controlled by a selector switch. The selector switch operates the necessary motorized valves furnishing either hot or chilled water to the coils. Thermostatic control of air temperature takes place by motorized operation of coil bypass valves.

What Limits Have Been Found?

Up to the present state of development and application, what limits have been found? The width of entrances still has not been reached. The wider entrances require greater detailed attention to proper air handling to insure equal air discharge from side to side and from front to back. Height recommendations remain at 8 ft, with practical comfort installations from 7 to 10 ft heights. Industrial work limitations from the 12 ft height have been increased to the 18 ft range. Early entrances 8 to 12 ft wide advanced to 18 ft wide, and now entrances 33 to 41 ft wide are under construction.

For night closure the first installations used swinging doors propped open during entrance usage. Sometimes the full effectiveness of the opening was impaired by an intermediate door jamb. Most recent units have used the sliding panel closure, which recesses into side pockets during entrance usage and provides the maximum opening. Most of these panels incorporate a pair of swinging doors for emergency use.

Control Now Automatic

Directional air discharge and air velocity change have been put on an automatic control. A sensing point is on each side of the curtain. An increase in pressure from either side positions the nozzles to provide a direction of air discharge to counteract the increase. Air velocity is increased directly with the air directional change. Maximum air velocity is provided at maximum outward direction and minimum air velocity at the straight down air direction — the latter used during a balanced inside and outside pressure condition.

Generally, all pets — dogs in particular — have not entered the buildings through the air curtain. Dogs on leashes have in some cases gone through with no apparent hesitation.

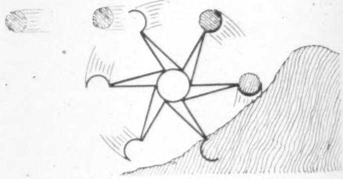
Insect stoppage has been very effective. Some large flies have penetrated the entrance; however, they are then generally caught on the return trip. One installation has a great quantity of large flies concentrating at the sunny entrance, and the results have been satisfactory.

35 Ft Unit Costs $1 Per Hr

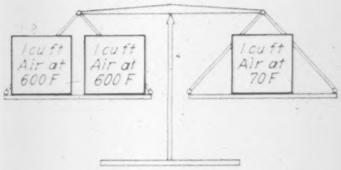
Operating costs have been obtained on a 35 ft wide entrance operating at a yearly average outdoor temperature of 37.4 F. Operating 3000 store hours with an individual oil fired heating plant, the total cost of operation was slightly less than $1.00 per hr, including filter and pit cleaning labor.

Saving on store heating, reduction of cleaning costs, removal of door accidents, and door maintenance costs — although more difficult to accumulate — all increase the value of this operation. +

Tear out along this line



1 A FAN WHEEL on a given system will move the same volume of air regardless of what the air weighs



1 cu ft Air at 600 F
1 cu ft Air at 600 F
1 cu ft Air at 70 F

2 AIR weighs half as much at 600 F as it does at 70 F; therefore, to move the same volume the fan requires only half the horsepower at 600 F. Also, the air will create only half the static and velocity pressures

How to Select the Right Fan For Heat and Altitude Applications

BY C. JACK TRICKLER

Chief Engineer
The New York Blower Co.

ONE of the most confusing problems in fan selection is that of selecting the right fan and motor for handling air at other than standard air densities. This usually means heat or altitude applications. Fundamentally the problem is quite simple, but is often made confusing by incomplete specifications or lack of basic knowledge.

Fan ratings are for standard air at a density of 0.075 lb per cu ft. This is 29.92 in. barometer, 70 F dry bulb, and 50 percent relative humidity. When the density is not standard, corrections must be made.

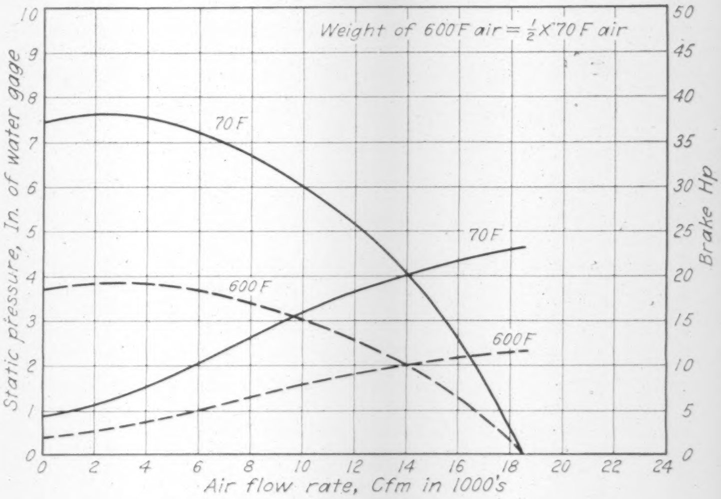
A fan wheel is similar to a shovel. On a given system it will move the same volume of air regardless of what the air weighs. If a fan will move 1000 cfm at 70 F, it will also move 1000 cfm at 600 F. But since air at 600 F weighs just half as much as it does at 70 F, it will require just half the horsepower:

600 F + 460 F = 1060 F absolute
70 F + 460 F = 530 F absolute
1060 F = 2 × 530 F

Likewise, since the air weighs half as much, it will create only half the static and velocity pressures. This is easily seen if the comparison of throwing two balls against a wall is made. If one weighs 1 lb and the other 2 lb and both are thrown at the same speed it will take half the energy to throw the 1 lb ball and it will strike the wall with half the force.

Example 1.

A fan at 70 F delivers 5800 cfm at 2800 fpm OV against 6 in. SP at 1182 rpm and consumes 9.6



3 EFFECT OF TEMPERATURE on fan performance in terms of static pressure and volume is shown here bhp. If the system and rpm remain constant what will it do at 600 F?

Air at 600 F weighs half as much as air at 70 F. Therefore the fan will still deliver 5800 cfm at 2800 fpm OV at 1182 rpm, but it will now only develop 3 in. SP and require only 4.8 bhp. However, this is not a typical problem. Usually it is desired to deliver a volume of air against the SP at the higher temperature.

Example 2.

Required: 5800 cfm at 600 F and 6 in. SP at 600 F. (This means that the actual measurable SP at 600 F will be 6 in.)

Because ratings are based on 70 F air, we must first determine what the SP and rpm will be at 70 F. Since air at 70 F weighs twice as much as air at 600 F, the SP developed at 70 F would be 2 × 6 = 12 in.

Selecting a fan for 5800 cfm at 12 in. SP gives 1565 rpm and 18.0 bhp. Since the fan will operate at 600 F, the horsepower will be 18.0/2 = 9.0 bhp.

Quite often in heat work, the fan will start up handling cold air and after running will handle warmer air. This might be the case in an oven exhaust fan. If Example 2 were such a case, then the fan would require 18.0 bhp when operating cold—at 70 F—and 9.0 bhp when the oven had warmed to 600 F. Very often a damper is furnished with the fan so that during the warmup period the fan can be dampered to reduce the horsepower. Thus, in Example 2, a damper could be used to reduce the cold bhp to less than 10 bhp so that a 10 hp motor could be used. Without the damper a 20 hp motor would be needed. Or if the warmup period is for only a couple of minutes a motor sized halfway between hot and cold could be used.

The confusion in selecting fans for handling heated air could be avoided by stating the temperature at which the static pressure was calculated. In Example 2 the specifications should read either:

> 5800 cfm at 600 F and 6 in. SP at 600 F

or:

> 5800 cfm at 600 F and 12 in. SP at 70 F

Example 3.

Required: 5800 cfm at 5000 ft altitude and 6 in. SP at 5000 ft altitude. Air at sea level weighs 1.2 times as much as air at 5000 ft; therefore, the sea level SP = 1.2 × 6 = 7.2 in. SP.

Selecting a fan for 5800 cfm at 7.2 in. SP gives a fan at 1264 rpm at 11.08 bhp. At 5000 ft altitude the bhp = 11.08/1.2 = 9.23 bhp.

Where both heat and altitude are combined, the air is rarefied by each independently so that the factors used are multiplied together.

Example 4.

Required: 5800 cfm at 600 F at 5000 ft altitude and 6 in. SP at 600 F at 5000 ft altitude.

Air at 70 F at sea level weighs 2.0 × 1.2 = 2.4 times as much as at 600 F and 5000 ft altitude.

At sea level and 70 F, SP = 2.4 × 6 = 14.4 in. SP. Selecting a fan for 5800 cfm at 14.4 in. SP gives a fan at 1690 rpm and 21.1 bhp. The bhp at 600 F and 5000 ft altitude = 21.1/2.4 = 8.8 bhp. If the fan were to start cold, it would still be at 5000 ft altitude and hence be handling rarefied air. 21.1/1.2 = 17.6 cold bhp.

When selecting or applying fans for handling heated air it is always wise to give thought to possible temperature variations. Variations downward will increase horsepower, while variations upward may exceed safe temperatures. ‡

TABLE 1—CORRECTION FACTORS shown here for various temperatures, F, are used to obtain required SP rating when selecting a fan to move a given volume of air at any temperature up to 800 F. Multiply the factor times the desired actual measurable SP of the fan at that temperature

F	Factor	F	Factor	F	Factor
0	0.87	180	1.21	450	1.72
20	0.91	200	1.25	500	1.81
40	0.94	225	1.29	550	1.91
60	0.98	250	1.34	600	2.00
70	1.00	275	1.39	650	2.10
80	1.02	300	1.43	700	2.19
100	1.06	325	1.48	750	2.28
120	1.09	350	1.53	800	2.38
140	1.13	375	1.58		
160	1.17	400	1.62		

TABLE 2—CORRECTION FACTORS shown here for various altitudes, ft above sea level, are used to obtain required SP rating when selecting a fan to move a certain volume of air at any altitude up to 10,000 ft. Multiply the factor times the desired actual measurable SP of the fan at that altitude

Ft	Factor	Ft	Factor	Ft	Factor
0	1.00	3500	1.14	7000	1.30
500	1.02	4000	1.16	7500	1.32
1000	1.04	4500	1.18	8000	1.35
1500	1.06	5000	1.20	8500	1.37
2000	1.08	5500	1.22	9000	1.40
2500	1.10	6000	1.25	10,000	1.45
3000	1.12	6500	1.27		

Note: If correction factors for both temperature and altitude are required, multiply the two factors together to obtain a combination factor.

The object of the Society is to advance the arts and sciences of heating, ventilating, cooling and air conditioning, and the allied arts and sciences, for the benefit of the general public, to encourage and conduct scientific research, and to cooperate with other organizations having the same or similar objectives.

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Heating, Piping & Air Conditioning

Journal Section

of the

AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS

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SOCIETY COMMITTEE ORGANIZATION

General Committees: The By-Laws provide for 9 such committees. The latest list appears in the August 1957 issue on page 156

Research Committees: The research program is under the guidance of the Committee on Research — a General Committee. The Committee on Research appoints Technical Advisory Committees as needed. The listing appears in the September 1957 issue on page 180

Special Committees: At present there are 9 of these committees. The latest list of them and of their personnel can be found in the August 1957 issue on page 156

Nominating Committee: This committee's membership is fixed by the By-Laws. The latest listing appears in the August 1957 issue on page 156

SOCIETY REGIONAL ORGANIZATION

The latest listing of the names of the Regional Directors and of the members of the Chapters Regional Committees appears in the April 1957 issue on page 176

SOCIETY CHAPTERS AND BRANCHES

The Society has chartered 69 Chapters, 1 Overseas Branch, and 6 Student Branches. These groups elect their officers and governing boards. A list of the presidents and secretaries appears in this issue on pages 165-166

The President's Page

Some Questions of Current Society Interest

LAST month on this page I discussed some of the points which are involved in the problem of cooperation with other societies and organizations similar to our own. I indicated there that the cooperation problem is but one of those arising because of the normal growth of the Society both in size and in outlook. There too, I mentioned two further items which also arise from growth of our Society, as being: (1) What type of material should be included in our JOURNAL?; and (2) What about the arrangement of Programs at our MEETINGS?

Some points about both these problems can be discussed here most appropriately, for both are of direct interest to all members of the Society.

The JOURNAL

What is the JOURNAL? What should it be? It is the monthly pipeline direct to the membership of the Society with news about Society affairs and activities, technical papers that are given at meetings of the Society, and the legally required notices and announcements that are stipulated in the By-Laws.

Some of the JOURNAL questions that concern the Council and the Publication Committee are: (1) Should the technical papers be presented in full as they are now or in a digest (shortened) form or in an abstract? (2) Should technical papers be prepared in a mimeographed or by photo offset printing of 300 to 500 copies, which would be sufficient for distribution as preprints at meetings and for later distribution by mail to interested members, with only an abstract provided in the JOURNAL? (3) Should more semi-technical stories and news items of interest to the members be published? (4) Should we limit the listing of Society committee organizations and thereby make space available for other material?

MEETING Arrangements

In recent years, the Program and Papers Committee has scheduled concurrent sessions at the Society Annual and Semi-Annual Meetings. At Annual Meetings, these concurrent sessions have been well attended, but at the Semi-Annual Meetings, these concurrent sessions have competed for attendance with the non-technical affairs so popular at Semi-Annual Meetings and with each other, with often rather poor attendance at the individual sessions as a result.

Yet, we do need the meeting time that is made available by these extra sessions if we want to schedule the many papers that are now being submitted to the Society for presentation, and to provide time for the symposium sessions that are now being included in meetings. It is the present philosophy of the Program and Papers Committee that these symposium sessions provide a valuable sounding board for the exchange of a great deal of useful information. While this is true if the material presented at these symposium sessions is good, it may not be so true if the material presented is mediocre, and the difficulty is that there is no good way to determine whether symposium material will be good or not until it is presented.

Therefore, prominent among the meeting program questions that face the Council, the Publication Committee and the Program and Papers Committee are: (1) How about symposium-type sessions? (2) How about concurrent sessions? and (3) Are the resultant disadvantages of symposium and concurrent sessions more than counterbalanced by the advantages?

While your officers and committees have the direct responsibility for reaching adequate solutions to all these growth problems which confront us, still every member has some responsibility also. All of us want to keep the Society programs and publications in line with the changing times and with the needs of a growing membership. I shall welcome your ideas and opinions.

P. B. Gordon
President
AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS

Cooling Load from Thermal Network Solutions

by Harry Buchberg*, Los Angeles, Calif.

This paper is the result of research sponsored by the AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS, in cooperation with the Department of Engineering, University of California, Los Angeles.

SUMMARY — Solutions of several thermal networks representing a test house were obtained by means of a dc electric network computer. The solutions demonstrate the separate influence on cooling load prediction of various solar inputs to opaque wall and roof surfaces, diffuse solar power transmitted through glass areas, long-wave radiation exchange with the surroundings, and radiation exchange between inside surfaces. Solutions were obtained with a *fine* network and with networks of various degrees of simplification for comparison.

THE STUDIES described in this paper are an extension of work reported on previously[1,2]. In these studies an evaluation was made of the importance of many influencing factors on the sensible cooling load in a light frame test house subjected to the time variable climate. Among the factors considered were:

1. The separate solar inputs for the various wall orientations and the roof.
2. The diffuse solar power transmitted by shaded glass areas.
3. Long-wave radiation exchange with the surroundings.
4. Radiation exchange between inside surfaces.
5. Heat sources within the space.

Methods Used

The factors listed were evaluated by obtaining electric analogue solutions of the thermal network representing the test house heat transfer system. It will be noted that all of the factors mentioned are concerned with the boundary conditions imposed on the network and with the manner in which the heat conduction paths through the structure are coupled on the inside. In addition, several different conduction path representations were investigated. These comprised a fine net and various degrees of simplification.

System Investigated

The system investigated was the one-room wood frame dwelling described in detail in Reference 1 and shown schematically in Fig. 1. To conserve space, the details of construction will not be repeated here. Likewise, the thermal network principles and idealizations made in drawing the network, shown in Fig. 2, were presented in detail in earlier publications[1,3]. The thermal network shown in Fig. 2 differs from that given in Fig. 3 of Reference 1 in two respects. *First,* the conduction paths are shown here as 4-terminal networks labeled Z_W, Z_E, etc., without showing the R-C net, except for Z_G. Table 1 presents a description of the conduction path impedance networks used in various solutions. *Second,* for purposes of determining the cooling load required to maintain the space temperature constant at the specified value, the inside air temperature point, τ_i, is shown grounded through a small resistance. The input potentials were then all reckoned with respect to τ_i, the reference temperature.

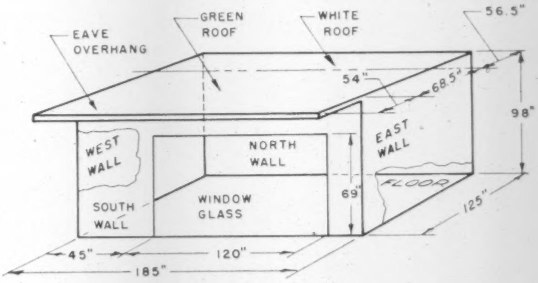


Fig. 1 — Schematic diagram of test house

Thermal Network Solutions

The thermal network solutions were obtained with a dc electric network computer known as the Thermal Analyzer[4]. As shown in Fig. 2, the boundary inputs comprised the diurnal ambient air temperature t_o, a time variable longwave radiation temperature t_{LW}, and time variable thermal current inputs q_s, representing the solar energy absorbed by each of the exposed surfaces.

The special equipment used to provide the necessary time-variable inputs and the actual values used are given in Reference 1. The only additional equipment was a dividing resistance network and constant potential source used to provide the in-

Table 1— Description of the conduction path network configurations[a]

Configuration Designation	Description
A	The conduction path networks are the same as those shown in Fig. 3, Ref. 1, consisting of a *fine* net of parallel tee branches representing the paths through wall studs or ceiling joists and the space between structural members.
B	Simplified conduction path networks in which the parallel paths are replaced by a single path, considering the frontal area taken by the structural members as additional air space, but maintaining the same fineness of lumping as configuration A.
C	The same as configuration B except that the number of lumps representing each conduction path was reduced as follows: Wall Sections: Reduced from 6 to 3 lumps Roof Sections: Reduced from 3 to 2 lumps Floor Section: Reduced from 2 to 1 lump

[a] For the network diagrams, see Figs. A-1, 2, and 3 in the Appendix.

---

*Associate Professor of Engineering, Department of Engineering, University of California.

[1] Exponent numerals refer to References.

For presentation at the 64th Annual Meeting of the AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS, Pittsburgh, Pa., January 1958.

put currents representing the diffuse solar power transmitted through the shaded glass area and absorbed on all surfaces *seen* by the sky. In some cases all of the current was directed either to the inside surface of the north wall or the floor as noted.

The network solutions consisted in measuring the potential τ_i above ground (proportional to the sensible cooling load) and other potentials in the network corresponding to surface temperatures. The resistance through which the inside air potential point was grounded was selected to give a maximum variation in τ_i that was at least an order of magnitude smaller than the reference or inside air temperature (76 F or 76 volts). The scale factors between the thermal and electrical analogous quantities were the same as those reported in Table 1 of Reference 1 and are given in Table A-1 in the Appendix. A list of the solutions obtained is given in Table 2. Solutions-1a and-1b of the network were obtained considering τ_i as a dependent variable. For this case the τ_i point was grounded through a capacitor representing the thermal capacitance of the air in the room. It should also be noted that solution —2 is the solution of the network shown in Fig. 2.

Table 2 — Description of electric analogue solutions

Solution Designation	Description
— 1a	Prediction of τ_i, dependent variable $(q_{sd})_G$, diffuse solar radiation transmitted by glass, neglected
— 1b	Prediction of τ_i, dependent variable $(q_{sd})_G$, included in network
— 2	Prediction of sensible cooling load, τ_i = 76 F $(q_{sd})_G$, neglected
— 3a	Prediction of sensible cooling load, τ_i = 76 F $(q_{sd})_G$ included in network
— 3b	Prediction of sensible cooling load, τ_i = 76 F Total $(q_{sd})_G$ directed into floor
— 3c	Prediction of sensible cooling load, τ_i = 76 F Total $(q_{sd})_G$ directed into north wall
— 5a	Prediction of sensible cooling load, τ_i = 76 F $(q_{sd})_G$ and (q_s) for all exposed surfaces neglected
— 5b	Prediction of sensible cooling load, τ_i = 76 F $(q_{sd})_G$ neglected, $(q_s)_{R1 \text{ and } R2}$ (Solar radiation absorbed by roof) included but all other solar inputs neglected
— 6	Prediction of sensible cooling load, τ_i = 76 F $(q_{sd})_G$ and inside radiation exchange network neglected
— 7	Prediction of sensible cooling load, τ_i = 76 F $(q_{sd})_G$ and q_s (inside heat source) neglected
— 9	Prediction of sensible cooling load, τ_i = 76 F $(q_{sd})_G$ and outside longwave radiation exchange neglected
— 10a	Prediction of sensible cooling load, τ_i = 76 F $(q_{sd})_G$ and $(q_s)_W$ (west wall solar input) neglected
— 10b	Prediction of sensible cooling load, τ_i = 76 F $(q_{sd})_G$ and $(q_s)_{R1 \text{ and } R2}$ (roof solar input) neglected
— 10c	Prediction of sensible cooling load, τ_i = 76 F $(q_{sd})_G$ and $(q_s)_E$ (east wall solar input) neglected

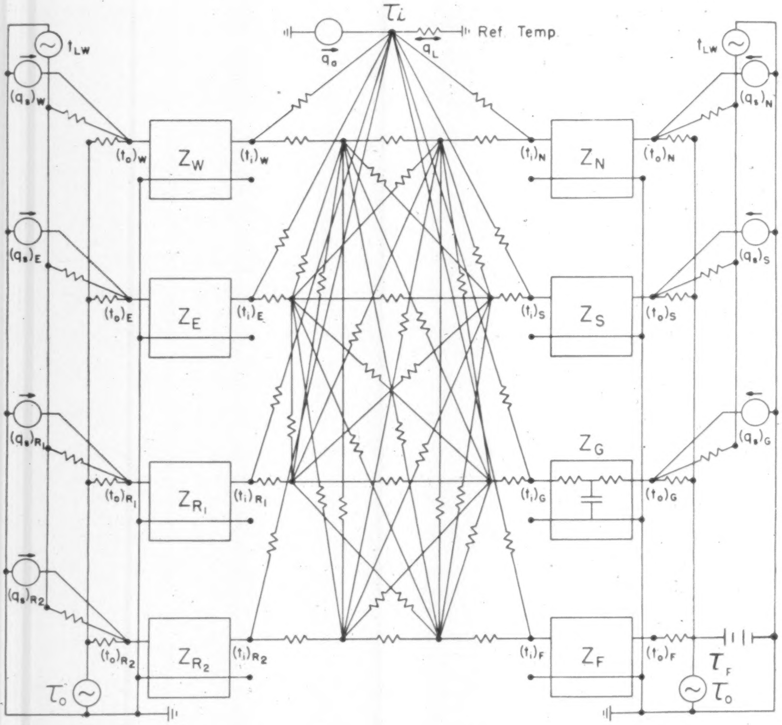
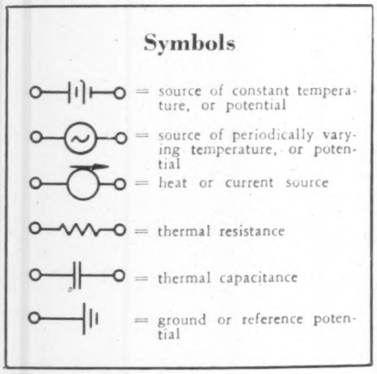


Fig. 2 — Basic thermal network representing the idealized test house



Symbols

= source of constant temperature, or potential

= source of periodically varying temperature, or potential

= heat or current source

= thermal resistance

= thermal capacitance

= ground or reference potential

All other solutions after —2 required some modification in the boundary inputs as noted in Table 2.

Computer Results Discussed

The solutions described in Table 2 are shown graphically in Figs. 3, 4, 5, 6, and 7. Each curve is identified in the legend by a capital letter and dash number. The letters A, B, and C refer to the conduction path configurations, given in Table 1, and the dash number refers to the boundary conditions imposed during the solution of the network (see Table 2). In Figs. 3, 4, and 5 where the sensible cooling load in Btu per hr is given as a function of time for a 24-hr period, the separate influences of various solar inputs, diffuse solar power transmitted through glass, longwave radiation exchange inside and outside, and the inside heat source are readily apparent.

Beginning with Fig. 3 configuration A, (the fine net) one may compare curves A-2, A-3a, and 6. Using solution —2 as the standard it can be seen that the predicted peak instantaneous load is increased by about 9 percent when the diffuse solar power transmitted through the glass is accounted for. The increase in daily cooling load, however, is about 5 percent. Solutions with the simplified configurations B and C indicate the same trend but the difference in peak load are slightly less than that predicted with the fine net. Fig. 7 indicates that inclusion of diffuse transmitted solar power had the effect of increasing the prediction of space temperature by 1 to 2 deg for most of the day. From Figs. 3 and 4 it is quite apparent that the transmitted diffuse solar power can be handled equally well by assuming that all of the power is incident on either the floor or wall opposite the glass. The load prediction, particularly with the fine net, was indistinguishable for the 3 solutions, —3a, —3b, and —3c.

The separate influences of the various solar inputs may now be examined. A comparison of solutions —5a, —5b, —5c, —10a, —10b, and —10c with solution —2 in Figs. 3, 4, and 5 illustrates dramatically the importance that solar inputs to the various exposed surfaces can have on cooling load predictions. The total daily cooling load, without considering the solar inputs through all opaque walls, was only about 22 percent of the total daily load including all inputs. Other interesting observations that can be made regarding the effect of solar inputs are:

1. For exposed roofs, solution —5b and —10b indicate clearly that the roof solar input is the most important of all and must never be neglected, in this instance, accounting for almost 60 percent of the total daily load.

2. Solution 10a indicates the value of wall insulation in the reduction of cooling

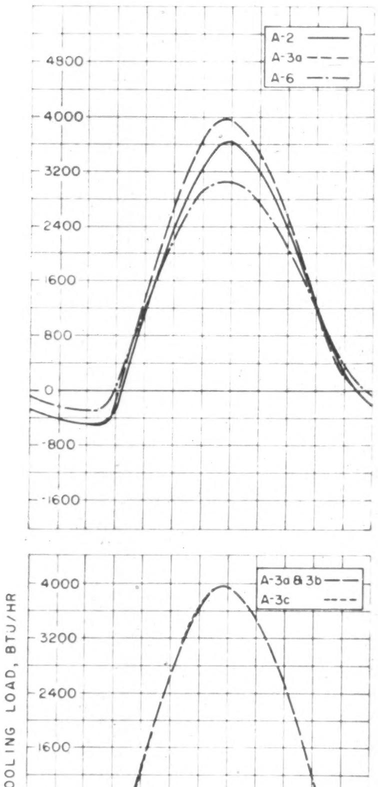


Fig. 3 — Cooling load curves based on solution of thermal network configuration A

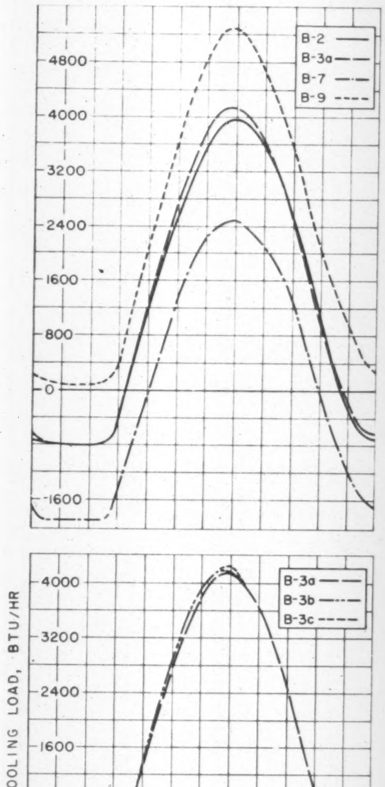


Fig. 4 — Cooling load curves based on solution of thermal network configuration B

Nomenclature

C = heat capacity, Btu per Fahrenheit degree.
E = electrical potential, volts.
i = electrical current, amperes.
q = heat flux, Btu per hour.
q_a = interior heat source, Btu per hour.
q_L = sensible cooling load, Btu per hour.
q_s = solar input or direct solar energy absorbed by an exposed surface. Btu per hour.
$(q_{sd})G$ = diffuse solar radiation transmitted by the glass area, Btu per hour.
R = resistance to heat transfer, Fahrenheit degrees per Btu per hour.
t_i = inside surface temperature, Fahrenheit.
t_o = outside surface temperature, Fahrenheit.
t_{LW} = outside long-wave radiation potential, Fahrenheit.
Z = conduction path thermal impedance, Fahrenheit degrees per Btu per hour.

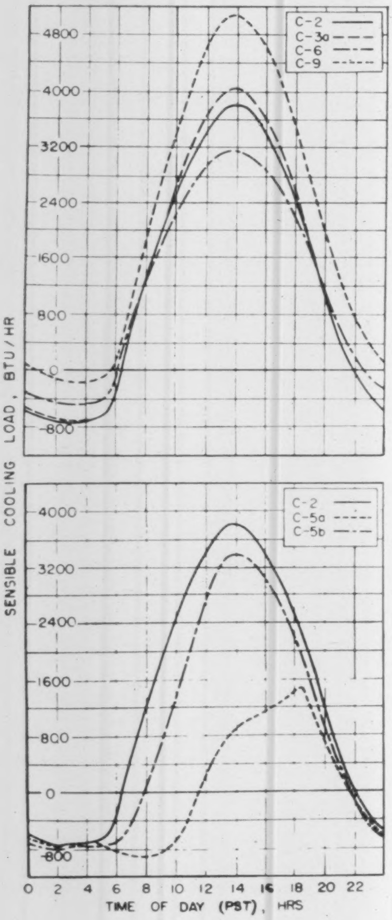
Greek Letters

θ = time.
τ_i = inside ambient air temperature, Fahrenheit.
τ_o = outside ambient air temperature, Fahrenheit.

Subscripts

E = east wall.
F = floor.
G = glass.
N = north wall.
R_1 = white roof section.
R_2 = green roof section.
S = south wall.
W = west wall.

loads. The *insulated* west wall accounts for only a very small part of the total daily load while the uninsulated east wall accounts for about 16 percent.



3. It should also be noted that the solar input to the east wall is much more effective in increasing the peak instantaneous load, building up during the morning hours, while the west wall solar load merely widens the load curve increasing the load in the afternoon and evening and night depending on the time constant of the wall. For buildings having primarily day occupancy, attention to the east exposure is important in cooling load considerations.

4. The effect of south wall solar input does not appear in this investigation because the south exposure was shaded by eaves overhang.

The influence of longwave radiation exchange on cooling load is considerable. Comparing load curve B-9 with B-2 in Fig. 4 it can be seen that the predicted peak instantaneous load is increased by about 34 percent and the total daily load by about 53 percent when longwave radiation exchange with the surroundings is neglected. The effect of neglecting longwave radiation exchange between the interior surfaces can be seen by comparing load curve A-6 with A-2 in Fig. 3. The effect was to reduce the predicted peak instantaneous load by about 15 percent and the total daily load by about 9 percent. As the interior surface temperature differences become less the importance of considering radiation exchange becomes less.

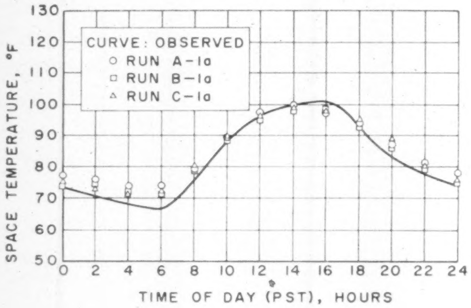


Fig. 6 — Prediction of space temperature-various network solutions compared to experimental data

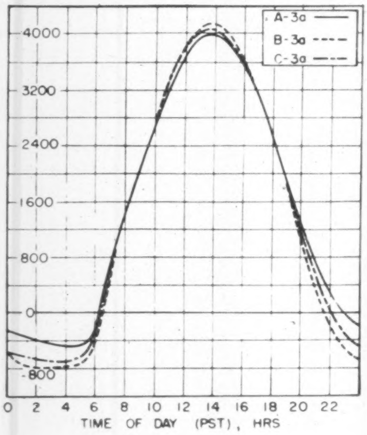


Fig. 5 — Cooling load curves based on solution of thermal network configuration C

Table 3 — Total daily cooling load and net 24-hr heat transfer

Curve No.	Daily Cooling Load Btu	24-hr Net Heat Transfer Btu
A-2	34,900	32,100
B-2	37,500	32,170
C-2	36,800	32,140
A-3a	36,700	33,890
B-3a	39,500	33,610
C-3a	38,400	33,730

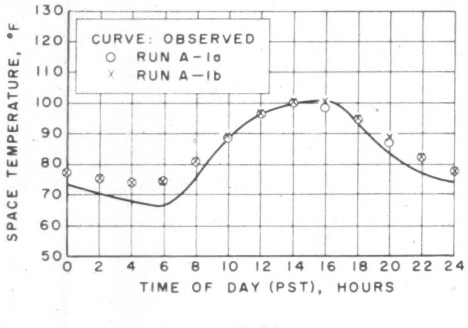


Fig. 7 — Prediction of space temperature illustrating the influence of diffuse solar radiation transmitted by glass area

As would be expected constant space heat sources have the effect of changing the dc level of the load curve. Comparing load curve B-7 with B-2 in Fig. 4 indicates clearly the dc shifts down when neglecting the constant inside source, q_a.

A comparison is made of solutions —3a for configurations A, B, and C in Fig. 5. Solution —3a includes all inputs. The maximum deviation in the peak instantaneous load between any of these solutions is only 4 percent: for the —2 solutions it is about 8.5 percent. Table 3 presents a comparison of the total daily cooling loads and net heat transferred during the 24-hr period or the net area under the load curve. As would be expected, the net heat transferred during a 24-hr period is substantially the same for all configurations for a specified set of boundary inputs. However, there are some differences in the total daily cooling load predicted. The maximum deviation between solutions is about 7 percent.

The space temperature predictions with configurations A, B, and C are compared in Fig. 6. The simplified configuration actually appears to give a slightly better prediction for the night hours than the fine net, A. However, this result is not significant. It can be stated that the differences in prediction between the various configurations appear to be less than the overall errors possible in this kind of calculation.

Conclusions

1. These studies demonstrate once more the flexibility in computing with a dc electric network computer when the influence of many variables in a complex thermal system is being sought.

2. It is apparent from these studies that fairly course networks can be used to achieve reasonable engineering accuracy in the prediction of cooling loads. A more detailed study of network *lumping* and its influence on the magnitude and phase angle of the impedance function for several typical wall constructions is now in process.

3. The effect of diffuse solar power transmitted through shaded glass areas on the cooling load prediction can adequately be included in a network solution by simply assuming that all of the power is incident on either the floor or the wall opposite the glass area, whichever is more convenient.

4. Solar inputs to opaque walls and roof can be very important in the prediction of cooling loads particularly for small uninsulated structures with several exposures and windows shaded from direct sunlight. All solar inputs should be evaluated before any are deleted from the network.

5. Longwave radiation exchange with the surroundings can influence greatly the predicted cooling load, particularly when exterior building surface temperatures rise appreciably due to incident solar power.

6. Longwave radiation exchange between interior surfaces usually does not have a large influence on cooling loads, but may have a significant effect and should be evaluated before being deleted in any calculation. Inside radiation exchange will have a greater effect when significant radiation sources, such as luminaires are present in a room. Radiation sources within an enclosure may be treated as thermal current inputs to the inside surfaces exposed. This may be done by means of a dividing network in a manner similar to that used for diffuse solar radiation transmitted by glass areas.

Acknowledgment

Undergraduate students assisted in the machine calculations and reduction of data.

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2. ASHAE Research Report No. 1565 — Electric Analogue Studies of Single Walls, by Harry Buchberg (ASHAE Transactions, Vol. 62, 1956, p. 177).

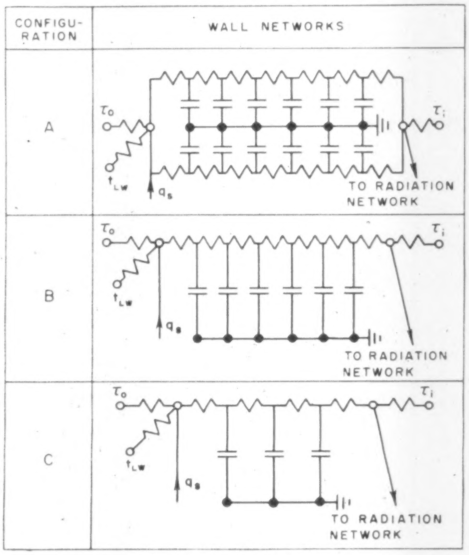
3. ASHVE Research Report No. 1497 — Circuit Analysis Applied to Load Estimating, by H. B. Nottage and G. V. Parmelee (ASHVE Transactions, Vol. 60, 1954, p. 59).

4. The Thermal Analyzer, A Special Purpose Computer, by W. L. Martin and R. Bromberg (*Proceedings of the Electronic Computer Symposium*, University of California, Los Angeles, April 30, 1952).

APPENDIX

A summary of scale factors used in the electric analogue solutions of the thermal networks is given in Table A-1. The thermal network configurations represent-

Fig. A-1 — Conduction path thermal network configurations for wall sections



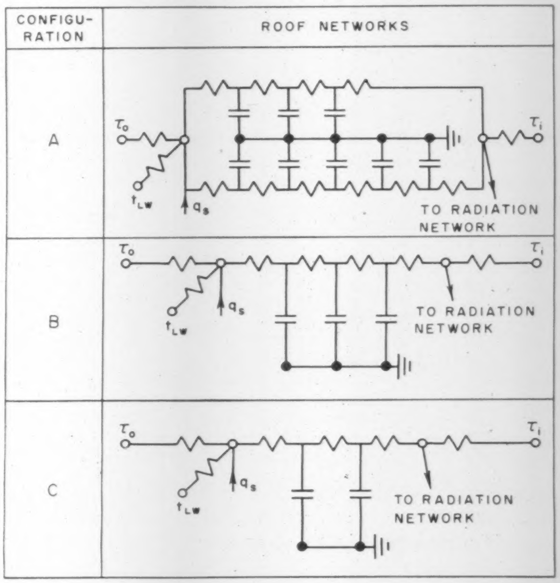


Fig. A-2 — Conduction path thermal network configurations for roof sections

ing the conduction paths of separate structural components are shown in Figs. A-1, A-2, and A-3. Each of these networks were represented by an impedance (Z) in the complete thermal circuit shown in Fig. 2. The dividing thermal network representing diffuse solar radiation absorbed and transmitted by the glass area and absorbed by the interior wall surfaces is shown in Fig. A-4. It will be noted that the diffuse solar radiation absorbed by the various surfaces was treated as thermal current inputs. The resistances in the dividing network depend on the shape factors between the surfaces and sky and on the radiation properties of the surfaces.

Table A-1—Summary of ratios and units of analogous electrical and thermal qualities

Quantity	Units		Scale Factors	
	Thermal	Electrical	Ratio	Value
Time	hrs	sec		2
Capacity	$\frac{\text{Btu}}{\text{F deg}}$	Farads	$\frac{C_t}{C_e}$	8 x 10^6
Resistance	$\frac{\text{F deg}}{\text{Btu/hr}}$	Ohms	$\frac{R_e}{R_t}$	16 x 10^6
Potential	F deg	Volts	$\frac{E}{t - t^a}$	1
Rate of Energy Transfer	$\frac{\text{Btu}}{\text{hr}}$	$\frac{\text{Coulombs}}{\text{sec}}$ or Amperes	$\frac{q}{i}$	16 x 10^6

t^a = Reference temperature. Subscripts: t = thermal circuit element, e = electrical circuit element.

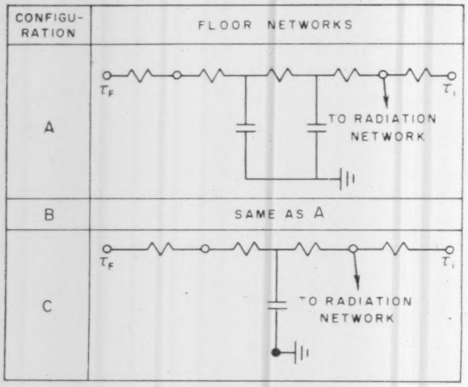


Fig. A-3 — Conduction path thermal network configurations for floor section

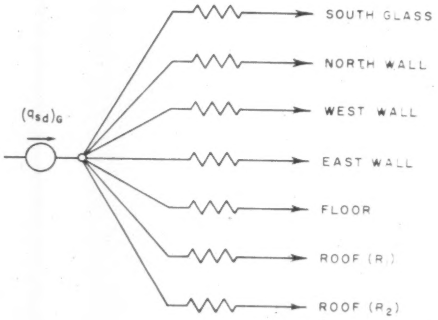


Fig. A-4 — Thermal dividing network representing diffuse solar radiation absorbed and transmitted by glass area and absorbed by interior wall surfaces

BULLETIN ON HEAT PUMP BURIED COIL

A research bulletin put out by the Texas Engineering Experiment Station is entitled, *The Design of a Heat Pump Buried Coil.* The bulletin presents a design procedure developed from data collected by a research project established to investigate, for Texas conditions, whether it is feasible to use a coil buried within a reasonable distance below the surface of the ground as a heat source and sink for a heat pump.

The purpose of the design procedure is to provide a means for logically attacking the problem of designing a buried coil which will serve the intended purpose. A considerable part of the experimental data and a description of the method conducting the project together with an equation derived from the data has appeared in an ASHAE paper (Earth as Heat Source and Sink for Heat Pumps, by D. M. Vestal, Jr., and B. J. Fluker. ASHAE JOURNAL SECTION, *Heating, Piping & Air Conditioning*, August 1956, p. 117).

The present bulletin is devoted largely to a description of the procedure used in the design. It contains a tabulation of coil configuration factors used and in an appendix 2 examples are worked out on a step by step basis illustrating how the procedure is used. It is also of interest to note that the procedure contained in the bulletin has been revised from a preliminary form in which it was published in September 1954 and the revisions were made as a result of the procedure having been used to design and install a number of residential buried coil heat pump systems in the Fort Worth area. The procedure thus has the experience of field installations behind it as well as the research project at the Experiment Station.

[*Bulletin* 139, August 1957, Texas Engineering Experiment Station, College Station, Tex., 6 x 9 in., 33 pages, @ $2.00.]

1958 NUCLEAR CONGRESS

The date for the 1958 Nuclear Congress is announced as March 17-21, and the place is the International Amphitheatre, Chicago. The general theme is to be *Industrializing The Atom*, and the congress is under the management of *American Institute of Chemical Engineers.* The whole congress is coordinated by *Engineers Joint Council* of which ASHAE is a member and a sponsor.

SV

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Stable Hot-Wire Anemometer for Low Speeds

By J. F. Kemp*, Pretoria, South Africa

SUMMARY — Extensive tests were conducted with the aim of developing a stable and accurate hot-wire anemometer, which would serve as standard for the routine calibration of other instruments in the speed range 0.1 to 15 fps. Five configurations of shielded velocity-sensing element were investigated, and only one of these proved to possess the required long-term stability.

The performance characteristics, as well as the design and mechanical construction of the hot-wire anemometer are described. Experimental evidence was obtained for the validity of a previously evolved formula, which enables corrections to be applied to speed measurements when the ambient temperature varies.

IN LOW SPEED aerodynamics, and particularly in ventilation work, instruments are often required for measuring speeds ranging from a fraction of 1 fps to 15 fps and higher values. None of the existing types of low speed anemometer function as absolute instruments, so that each individual anemometer has to be calibrated against a suitable standard instrument. At speeds above 15 fps an NPL type Pilot-static tube, used in conjunction with a sensitive manometer, is the most suitable standard available. At lower speeds, the differential pressure generated by the tube becomes too small to measure with convenience and accuracy, and resort has to be taken to other types of instrument.

Several proprietary instruments are available for measuring in the range below 15 fps but these invariably fail in one or more respects when the following requirements are stipulated: (1) Effective operational range to cover speeds from 0.1 fps to 15 fps, (2) Calibration to be permanent, and (3) effects of variations in ambient atmospheric conditions to be compensated for, either automatically in the operation of the instrument, or by virtue of corrections applied to speed measurements.

The second and third requirements are closely associated with the intrinsic accuracy of the instrument. A high intrinsic accuracy is really the basic requirement to be fulfilled if the instrument is to be employed as standard. Furthermore, by stipulating the forementioned range, provision is made for the availability of a *single* instrument to serve as standard at very low velocities. For much time is wasted, and calibrations become unnecessarily expensive, if 2 different standards have to be applied in covering a particular range.

The hot-wire anemometer described in this paper was therefore developed to fulfill the stipulated requirements and has been found to operate successfully in all respects.

Basic Considerations

If, initially, no other calibrated instrument is available, the calibration of a first standard is probably most accurately performed on a whirling arm according to the technique developed by Ower and Johansen[1]. The method involves the use of a full-size model *A* of the anemometer *B*, the calibration being carried out in 2 steps: *B* is first mounted on the arm and is moved at various constant ground speeds in an enclosed duct, the instrument indication being noted at each speed. *A*, the model, is then mounted on the arm, and *B* set up stationary inside the duct, with its velocity sensing element suitably positioned to measure its own swirl speed, so to speak, as the model is moved over the same range of ground speeds as before. Since swirl speeds are normally very much lower than the relevant ground speeds, the appropriate relative air speeds can be obtained by a graphical process of iteration and the final calibration curve plotted accordingly.

Its high sensitivity at very low speeds, in addition to the fact that its velocity sensing element can be made sufficiently small in size for the measurement of its *"own"* swirl velocities on the working circle of the whirling arm apparatus, are the main factors which contribute to the eminent suitability of the hot-wire anemometer as a first standard.

L. F. G. Simmons was responsible for one of the most notable improvements in hot-wire anemometry during recent years when he developed a shielded hot-wire instrument[2] to counteract mainly the adverse effects that dust deposition had on the stability of instruments employing thin, bare heater wires. Unfortunately the range of the Simmons instrument extends to only 5 fps in the upper limit; in order to increase the range to higher values, resort needs to be taken to an improved method of controlling the heating current[2] if the accuracy of the instrument is to be maintained.

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*Head of the Aeromechanics Division of the *National Mechanical Engineering Research Institute*, South African Council for Scientific and Industrial Research.

For presentation at the 64th Annual Meeting of the AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS, Pittsburgh, Pa., January 1958.

[1] Exponent numerals refer to References.

Journal Section

Development of A Hot-Wire System

Initially, therefore, the development of the new anemometer was centered upon the problem of devising a system in which the heating current could be controlled within very fine limits. The velocity sensing element was to be shielded in the manner suggested by Simmons. The system finally adopted was essentially the same as that previously used by the author in connection with the measurement of axial components of velocity[3]. The modified circuit diagram is depicted in Fig. 1.

In this system, a constant current *I* heats a nichrome wire of about 1-in. length at *B*. The heater wire is threaded through one of the bores of a twin-bore silica tube, the other bore being used to accommodate the hot junction of a copper-constantan thermocouple, whose cold junction is exposed to the ambient temperature in the air stream. Thus element *B*, when placed in an airstream, serves as velocity sensing element, the emf, E_B, being an indication of air speed.

Current indication is effected by means of element *K* whose construction is identical to that of *B*. *K*, however is housed in a *still-air* box, where the air velocity is zero. Under specified ambient conditions, the emf, E_K, will be a function of heating current *I* only. Current control is effected by means of rheostat *C* (coarse control) and slide wire *D* (fine, stepless control). The voltage stabilizer further enhances the accuracy of the control system, while fuse *F* safeguards the elements *B* and *K*.

The main advantage of the system is derived from the fact that current control is performed simultaneously with speed measurements. A second advantage is that an additional velocity sensing element, such as *A*, can be incorporated in the system. Thus, instead of using a model for calibration purposes in the manner already described, a second, working anemometer *A* can be constructed, and can be calibrated together with *B* with little additional effort.

A final advantage stems from the fact that the system lends itself readily to the application of the laws of heat transfer from slender cylinders in an airstream. Formulae can be derived to indicate the effects that variations in heating current and in ambient conditions have on the accuracy of speed measurement. These aspects will be considered next.

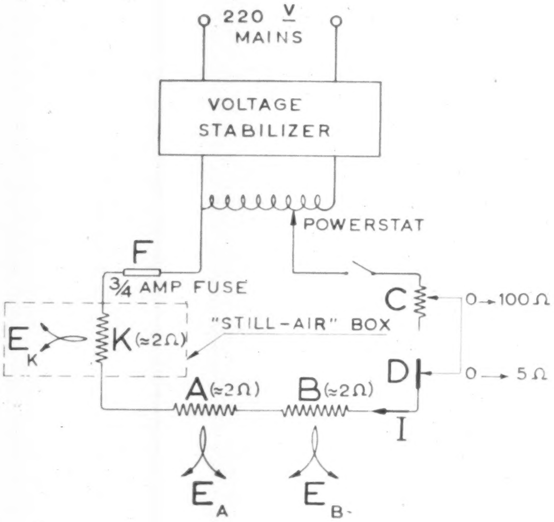


Fig. 1 — Hot-wire system employing constant heating current

Theoretical Considerations

Heat transfer from the velocity sensing elements *A* and *B* (Fig. 1) takes place mainly by virtue of forced convection. Over a wide range of Reynolds number R_e, the Nusselt number N_u can be expressed as a function of R_e by the following relationship derived from experimental results by Hilpert[4] on slender heated cylinders in an airstream:

$$N_u = hd/k_w = 0.743\ R_e^{0.43} \quad \ldots\ldots (1)$$

where

h = coefficient of heat transfer.
d = diameter of heated element.
k_w = thermal conductivity of air evaluated at the mean film temperature.

With an electric current *I* flowing through the hot-wire or resistance *R*, Equation 1 is applied to obtain the following relationship:

$$I^2R = c_1 k_w (R_e)^{0.43} (T_w - T_a) \quad \ldots\ldots (2)$$

where

c_1 = a constant.

$(T_w - T_a)$ denotes the effective temperature difference between the hot-wire element and the undisturbed airstream. This factor is measured in terms of an emf, (*E*, say), which may be assumed proportional to $(T_w - T_a)$ for the copper-constantan thermocouple over the operational range of temperatures of the element. Furthermore, the resistance *R* of the nichrome heater wire, whose temperature coefficient is extremely small, may be taken as constant.

Therefore,

$$I^2R = c_2 k_w (v/\eta)^{0.43} E \quad \ldots\ldots\ldots (3)$$

where

c_2 = a constant.
v and η = air velocity and kinematic viscosity respectively.

The current control element *K* loses heat by virtue of natural convection, and the Lorenz[5] equation for heat transfer may be applied in the form:

$$I^2R = c_3 k_K \eta^{-0.5} (T_K - T_a)^{1.25} (T_a)^{-0.25} \quad \ldots\ldots\ldots\ldots\ldots (4)$$

where

c_3 = a constant.
k_K = thermal conductivity of air at the mean film temperature of element K.
$(T_K - T_a)$ = effective temperature difference between the control element K and the airstream.

In the present system $(T_K - T_a)$ is maintained at a constant value, which is proportional to E_K, the emf of the thermocouple of the control element. Division of Equations 3 and 4 yields the following result:

$$E = C E_K^{1.25} \eta^{-0.07} v^{-0.43} T_a^{-0.25} \quad \ldots\ldots(5)$$

C includes the ratio k_w/k_K, which varies only slightly with ambient atmospheric conditions, so that C may be taken as a constant.

Equation 5 presents the relationship between the various parameters involved in the operation of the hot-wire system, and will be used as basis for further analyses.

Accuracy of System Under Constant Ambient Conditions

If η and T_a in Equation 5 remain constant, it is easily shown, by partial differentiation, that

$$\Delta v/v = 2.33\ (\Delta E/E) + 2.90\ (\Delta E_K/E_K) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(6)$$

In the system under consideration, E_K is measured by means of a field potentiometer having an accuracy of ± 2 microvolts, and is maintained at a value of approximately 4000 microvolt. E is measured by means of a vernier potentiometer to an accuracy of ± 1 microvolts. At the upper limit of the speed range, *i.e.* at 15 fps E has its smallest value which is of the order of 750 microvolt. Under these conditions the accuracy of the system is, theoretically, at its lowest and amounts to

$$(\Delta v/v \times 100) = (0.35 + 0.15) \text{ percent} = 0.5 \text{ percent}$$

Tests performed on 2 anemometers, which had been calibrated as a pair on the whirling arm, indicated that the agreement between the 2 instruments, when these were compared against each other at constant air speeds, closely followed the theoretical values calculated from Equation 5 down to a speed of about ½ fps where maximum accuracy was obtained. Below this speed, the agreement became less accurate, due rather to the method of calibration than any shortcoming in the operation of the anemometers, for it was

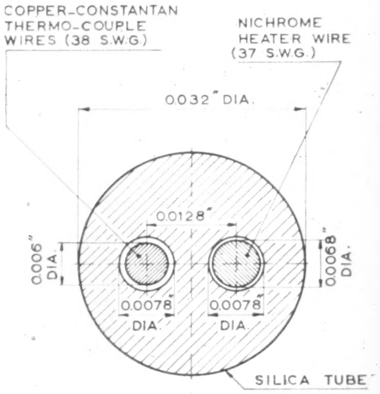

COPPER-CONSTANTAN THERMO-COUPLE WIRES (38 S.W.G.)
NICHROME HEATER WIRE (37 S.W.G.)
0.032" DIA.
0.0128"
0.006" DIA.
0.0068" DIA.
0.0078 DIA.
0.0078 DIA.
SILICA TUBE

Fig. 2 — Detail of Simmons-type element

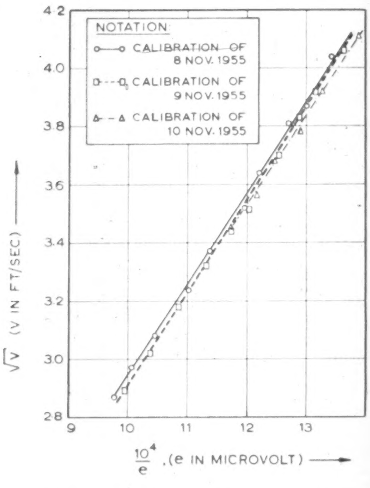
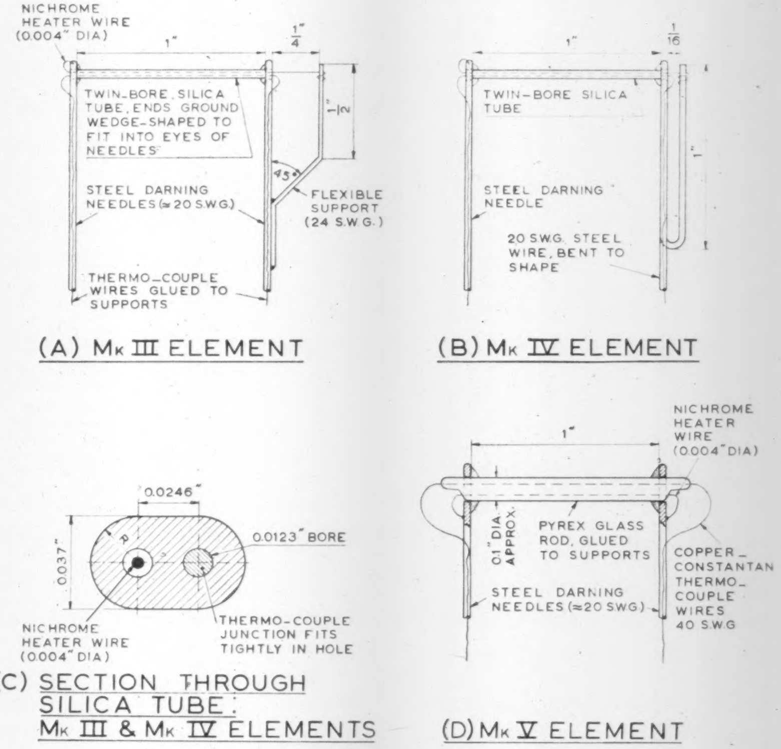


Fig. 3 — Instability at higher speeds of Simmons-type element


NICHROME HEATER WIRE (0.004" DIA)
1"
1/4"
1/2"
TWIN-BORE SILICA TUBE, ENDS GROUND WEDGE-SHAPED TO FIT INTO EYES OF NEEDLES
45°
STEEL DARNING NEEDLES (≈20 S.W.G.)
FLEXIBLE SUPPORT (24 S.W.G.)
THERMO-COUPLE WIRES GLUED TO SUPPORTS
1/16
TWIN-BORE SILICA TUBE
1"
STEEL DARNING NEEDLE
20 S.W.G. STEEL WIRE, BENT TO SHAPE
0.0246"
0.0123" BORE
0.037"
NICHROME HEATER WIRE (0.004" DIA)
THERMO-COUPLE JUNCTION FITS TIGHTLY IN HOLE
NICHROME HEATER WIRE (0.004" DIA)
0.1" DIA APPROX.
PYREX GLASS ROD, GLUED TO SUPPORTS
COPPER-CONSTANTAN THERMO-COUPLE WIRES 40 S.W.G.
STEEL DARNING NEEDLES (≈20 SWG)

(A) Mk III ELEMENT

(B) Mk IV ELEMENT

(C) SECTION THROUGH SILICA TUBE: Mk III & Mk IV ELEMENTS

(D) Mk V ELEMENT

Fig. 4 — Constructional details of Mk III, Mk IV, and Mk V elements

found that weak thermal currents in the whirling arm duct began to have a detrimental effect on the calibration at very low speeds. At 0.1 fps which represents the lower limit of the range of the anemometers, the difference between the instruments amounted to 4 percent.

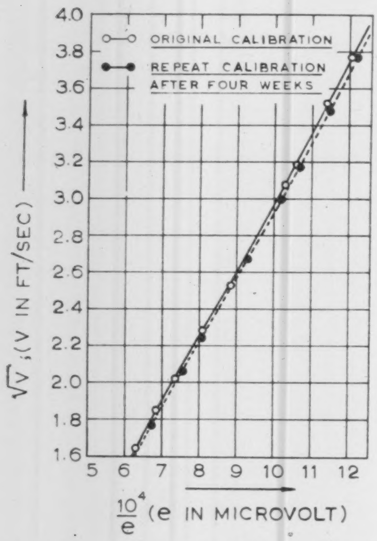


Fig. 5 — Instability of Mk IV elements

Variations In Ambient Conditions

If E_K in Equation 5 is maintained at a constant value, it is possible to deduce the effects on the accuracy of speed measurement of variations in atmospheric pressure, humidity and ambient air temperature. Furthermore, it can be shown that variations encountered from day to day in atmospheric pressure and humidity are of minor importance and that ambient air temperature is, in fact, the only variable that needs to be considered.

This was done in a previous paper[3] and the following expression was derived for temperatures T_a in the region of 20 C:

$$\Delta E/E = -0.38\ (\Delta T_a/T_a) \quad \ldots\ldots\ldots (7)$$

where

ΔE = the correction to be applied to the emf reading E, when the temperature varies by an amount ΔT_a from the value T_a (in degrees centigrade absolute) which obtained during calibration.

With the aid of Equation 7 it also becomes possible to correct individual emf readings taken during the calibration of the anemometers on the whirling arm, and to prepare a calibration curve relating to a uniform air temperature which might be chosen arbitrarily as, say, 25 C. The validity of Equation 7 was verified experimentally, and the results are discussed under the following Section.

Development of a Stable Thermo-Electric Element

The anemometers, and the still-air box containing the current control element, were initially equipped with shielded elements of the Simmons type in which a twin-bore silica tube, about 1 in. in length, was used to accommodate the heater wire and the thermocouple junction. A section through such an element is illustrated in Fig. 2. All the thermocouple junctions were welded, while the nichrome heater-wires were annealed by heating electrically and maintaining a red-hot temperature for several hours.

Altogether 4 anemometers and 2 still-air boxes equipped with these elements were thoroughly investigated and the tests repeatedly revealed instability of the elements, the phenomenon being most marked at higher values of air speed. Fig. 3, for example, illustrates how the calibration curves for a particular anemometer varied from day to day on 3 successive days.

The instability was eventually ascribed to the effect of thermal expansion and contraction of the heater wire in the silica tube. Since the 2 ends of the wire were welded to relatively sturdy steel supports, the wire was constrained in such a way that expansion and contraction could only be taken up by a lateral movement of the wire. Considering the high temperature gradients present between the wire and the thermocouple junction, especially at high air speeds, it is evident that any lateral displacement of the heater-wire would affect the temperature at the thermocouple. Since the lateral movement of the wire would furthermore not follow the same cycle every time the heating current is switched on or off, sporadic changes might be expected to occur in the calibration of the instrument.

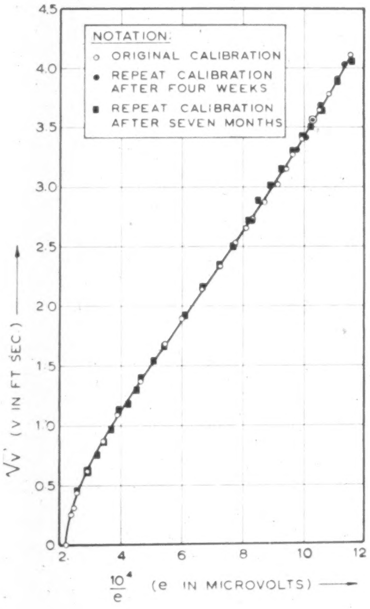


Fig. 6 — Calibration curves of anemometer with Mk V elements

A second configuration of the thermo-electric elements was now constructed in which the welded thermocouple junction was enlarged to ensure a snug fit in the silica tube, while the heater wire was bent to form zig-zag kinks along its length, again with the motive of ensuring a snug fit. Although some improvement was effected by this construction, unpredictable changes in the calibration curve were again revealed by test, indicating that displacements of the wire relative to the thermocouple still persisted.

Three different designs, designated by Mk III, Mk IV, and Mk V, respectively, were next investigated on the whirling arm. Constructional details of these elements are presented in Fig. 4. Mk III and Mk IV differ only slightly from each other, each employing a flexible support to keep the heater-wire straight and taut under all heating conditions and to enable the movement of the wire, whether expanding or contracting, to follow a fixed, repeatable cycle. A more robust silica tube had to be used than in the previous designs, since the tube was now subjected to a compressive force.

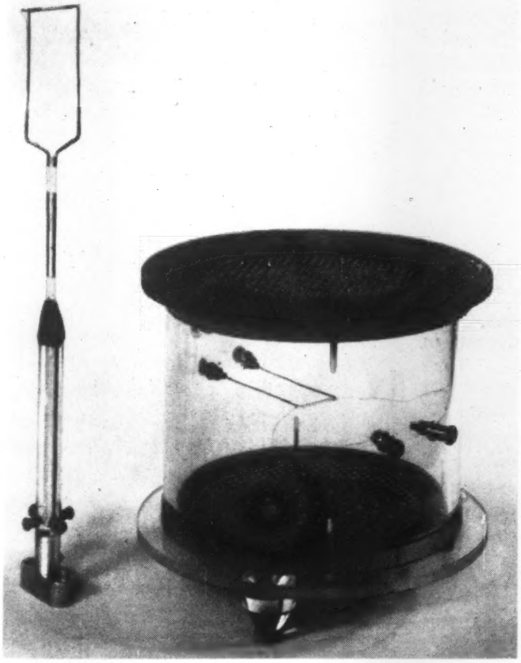


Fig. 7 — Photograph of hot-wire anemometer and still-air box

Tests indicated that a substantial improvement was effected in the stability of the anemometer by the introduction of the Mk III and Mk IV elements, inasmuch as sporadic day-to-day changes in the calibration curve were eliminated. It was evident, however, that a slow but steady change did occur in the calibration. After using the anemometer with Mk IV elements daily for a period of one week after the original calibration, speed indications were found to be consistently lower, the difference at the maximum speed of 15 fps amounting to approximately ½ percent. After 4 weeks of continual use, the instrument was again calibrated, and it was found that the difference had increased to about 2 percent at 15 fps. The two calibration curves are illustrated in Fig. 5. The only possible explanations for this long-term instability of the elements were: (1) that the physical and electrical properties of the heater wire had changed as a result of an aging process, or (2) that dust particles had penetrated into the silica tube through the unsealed end on the side of the flexible support. The results that were subsequently obtained for the Mk V element proved, however, that no aging effects were present.

The Mk V element was finally tested and proved to possess the required long-term stability. In this element both heater and thermocouple wires are fused into pyrex glass, the technique being briefly as follows: Two thin tubes of glass are first drawn and cut to the required length and are then fused separately on to the heater and thermocouple wires. Initially fusion is not carried out right up to the ends of the tubes since the thin wires easily burn when exposed to a flame. In the next step the two tubes are fused together and manipulated in the flame to form a solid rod near the middle, care again being observed not to bring the flame near the exposed wires at the ends of the tubes. Finally the exposed portions of the wires are threaded into 2 silica tubes of about ⅛-in. diameter, and with the wires thus protected against direct contact with the flame, the fusion process can be completed over the entire length of the element. In its final form the element therefore comprises the heater and thermocouple wires which are, in effect, fused into a solid pyrex rod. In this construction the wires are not only sealed against dust contamination, but are also prevented from moving relatively to each other or to the glass rod.

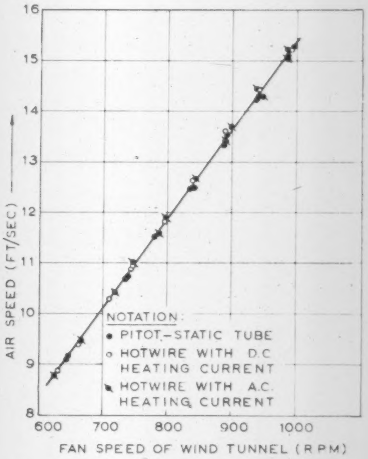


Fig. 8 — Comparison between anemometer and NPL type Pitot-static tube

The calibration curve of the anemometer, equipped with Mk V elements, is depicted in Fig. 6. The solid points on the curve represent the results of a repeat calibration that was performed after the anemometer had been in daily use for four weeks. A third set of points denotes the results of yet a further calibration carried out after the instrument had been in service for seven months. All curves had been plotted for an arbitrarily selected uniform temperature of 25 C, by applying the formula given in Equation 7. The ambient air temperature had been very much the same for the first 2 calibrations, but was considerably lower during the third calibration when differences up to 11 C were recorded. If the third calibration curve is plotted without correcting the results to the reference temperature 25 C, differences of over 3 percent are encountered at higher speeds when this curve is compared with the original. By applying the temperature corrections, however, the curve is displaced to coincide with the original. Assuming that the stability of the anemometer is proved by the results of the first 2 calibrations, the results of the third test can be taken as proof of the accuracy and usefulness of the temperature correction formula.

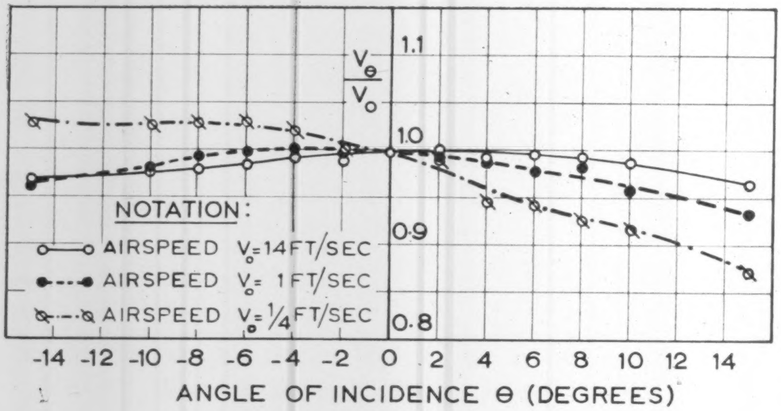


Fig. 9 — Directional response curves of anemometer

Fig. 7 shows the anemometer in its final form, together with its still-air box containing the current control element *K* (Fig. 1).

Additional Tests

Immediately after the original calibration had been completed, the hot-wire anemometer was removed to a 24-in. low speed windtunnel and the whirling-arm calibration checked in the speed range between 9 and 15 fps, using a calibrated NPL Pitot-static tube as standard in conjunction with a 13-in. manometer. The results of the test are presented in Fig. 8. The close agreement between readings of the 2 instruments serves to illustrate the basic correctness of the whirling-arm method of calibration.

Following this test, the response of the anemometer when its velocity sensing element was inclined from its normal vertical attitude (for which it had been calibrated) and in a vertical plane parallel to the direction of flow, was investigated at a high, a medium and a low velocity. The results are presented in the form of a graph in Fig. 9, where V_0 and $V\theta$ denote respectively the indicated speed at zero inclination and at an inclination θ. From the set of curves, it is evident that, as the speed decreases, the errors that would be introduced if the element should be inaccurately aligned to the vertical are increased. At ¼ fps for instance the percentage error introduced for each degree misalignment up to $\theta = 10$ deg amounts to nearly 1 percent, while at 14 fps the value is only about 0.15 percent. The phenomenon obviously originates from the presence of natural convection currents at the element, these currents having a more pronounced effect on the flow pattern at lower speeds than at higher speeds.

Acknowledgments

The work described in this paper was carried out in the *National Mechanical Engineering Research Institute* of the South African Council for Scientific and Industrial Research, as part of a thesis submitted to the University of Stellenbosch. The paper is published by permission of the University and of the South African Council for Scientific and Industrial Research.

The author also wishes to thank M. L. Strydom for his invaluable assistance during the development of this instrument.

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Make Plans Now for 64th Annual Meeting

Pittsburgh, Pa.—January 27-29, 1958

Chimney and Stack Design for Gas-Fired Equipment

By Richard L. Stone*, Belmont, Calif.

SUMMARY — The required height and diameter for stacks or chimneys for gas-burning equipment may readily be found using simple cut-and-try calculations in conjunction with draft and draft loss tables. Tables for theoretical draft, CO_2 concentration, system length to diameter ratio, operating average chimney gas temperature, and Btu per square inch loading, provide quick solutions to many vent and chimney design problems. For gas equipment requiring available draft, the theoretical draft must exceed flow energy losses by a margin sufficient to insure proper operating flexibility. Where draft hoods are used, stacks are designed simply by equating total system energy losses exactly to theoretical draft for the height of the stack needed.

DRAFT requirements of gas-burning equipment, including furnaces, ovens, boilers and related units, depend on whether or not the equipment has a draft hood. Those units with draft hoods need no stack action except that produced in the flue ways and within the combustion chamber of the equipment itself. Those without draft hoods may require the aid and assistance of a proper chimney or stack to burn the fuel at the desired rate to maintain desired internal pressure, to assure adequate air for correct combustion, and to sustain maximum firing rates.

The design methods for stacks, chimneys, and gas vents presented in this paper resulted from a study of the theoretical relationships governing chimney and gas vent operation. This study was directed at developing methods of tabulating important factors affecting draft and capacity in terms familiar to and common in the gas industry. The equation from which these tables were computed is related to those given in the ASHAE GUIDE[1] and in other references on this subject[2,3]. As is commonly known, the draft equation shows that available draft results from the difference between *theoretical* draft and energy losses due to flow. Common usage dictates the choice of the word *theoretical* although this effect is more correctly described as potential draft.

Table 1 — Theoretical or Potential Static Draft Pressure Produced under no-flow conditions in a venting system, inches of water column

Height of Chimney, Feet, Above Level of Draft Measurement	Average Temperature Rise Above Ambient 60 F of Gases in Vertical Part of Chimney, F Deg							
	150°	200°	300°	400°	500°	600°	750°	1000°
5	0.017	0.020	0.027	0.032	0.036	0.039	0.043	0.049
10	0.033	0.041	0.054	0.064	0.072	0.079	0.087	0.097
15	0.049	0.061	0.081	0.096	0.108	0.118	0.130	0.145
20	0.066	0.082	0.11	0.13	0.14	0.16	0.17	0.19
25	0.083	0.10	0.13	0.16	0.18	0.20	0.22	0.24
30	0.10	0.12	0.16	0.19	0.22	0.24	0.26	0.29
40	0.13	0.16	0.22	0.26	0.29	0.32	0.35	0.39
60	0.20	0.25	0.32	0.38	0.43	0.47	0.52	0.58
80	**0.26**	**0.33**	**0.44**	**0.51**	**0.58**	**0.63**	**0.70**	**0.78**
100	0.33	0.41	0.54	0.64	0.72	0.79	0.87	0.97
150	0.50	0.61	0.81	0.96	1.08	1.18	1.30	1.45
200	0.66	0.82	1.07	1.28	1.44	1.58	1.74	1.94
300	0.99	1.23	1.61	1.92	2.16	2.37	2.61	2.91

In a boiler-chimney system containing a draft diverter, available static draft applied at the draft diverter inlet, or to the boiler flue outlet is zero for all practical purposes because the entire system theoretical draft is balanced out by flow energy losses, which result from the draft-nullifying entrance of dilution air through the relief opening. Where the gas-burning equipment requires a fixed or variable amount of available draft, the chimney, breeching, and draft control system must be designed to produce the maximum amount needed. This draft may then be reduced by appropriate control devices to the amount needed to meet operating demands.

This approach permits the problem of chimney design for gas equipment needing draft to be separated into a 2-step procedure. These are: (1) from required draft based on expected stack gas temperature and equipment characteristics such as efficiency, over-fire static pressure, firing rate, steam pressure, or temperature, choose a stack height which will yield a theoretical draft greater than that needed for maximum available static draft. Note that other considerations such as building height, fume and gas dispersal, location of adjacent structures, may require greater chimney height than the amount theoretically called for; (2) from chimney operating conditions, choose a diameter at which the sum of the energy losses plus the available draft equals the theoretical draft.

Expressed as a simple equation this procedure states that:

Potential Static Draft = Available Static Draft + Static Draft Losses.

The exact terms of this equation are given in the Appendix†, along with

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*Chief Research Engineer, William Wallace Co.

[1] Exponent numerals refer to References.

For presentation at the 64th Annual Meeting of the AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS, Pittsburgh, Pa., January 1958.

†It is planned to publish the Appendix with the paper in TRANSACTIONS.

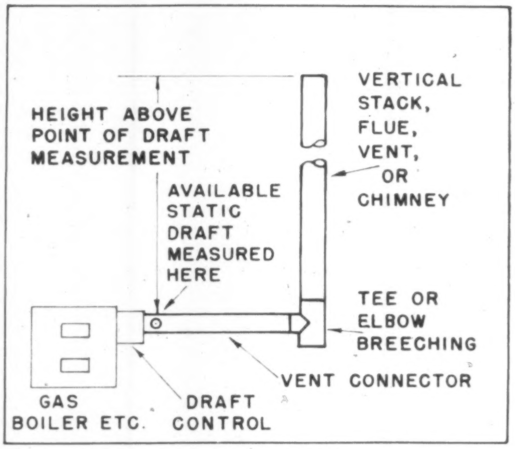
HEIGHT ABOVE POINT OF DRAFT MEASUREMENT
AVAILABLE STATIC DRAFT MEASURED HERE
VERTICAL STACK, FLUE, VENT, OR CHIMNEY
TEE OR ELBOW BREECHING
VENT CONNECTOR
GAS BOILER ETC.
DRAFT CONTROL

Fig. 1 — Location of available draft measurement in typical boiler stack system

a complete derivation, and an illustrated example. While an understanding of the equation is helpful to its direct application in solving problems, no reference to it need be made to use the tables given here for rapid chimney and stack design.

Stack Design Methods

The chimney design tables, based on the draft equation, can be readily employed to calculate the height and size of stacks and chimneys for gas equipment requiring draft, as well as for appliances having draft hoods. With either type of equipment it is necessary to start with Table 1 to obtain theoretical draft solely as a function of height and gas temperature. Next, the draft losses must be found using Table 2, 3, or 4. Tables 2 and 3 are applicable to chimney systems not having draft hoods, and give draft loss due to energy losses from the flowing stack gases containing 4 percent and 8 percent CO_2 respectively. Table 4 applies to gas venting where a draft hood is used. The stack or chimney is designed for draft using the applicable energy loss table so that draft produced by the stack will be greater than the equipment needs by a margin sufficient to insure proper equipment operation under all stack flow conditions. For gas vents, the system is designed for zero draft by equating losses from Table 4 to theoretical draft for the chosen height.

The typical arrangement of gas equipment, lateral connector, breeching, and vertical stack or chimney to which Tables 1, 2, 3, and 4 apply is shown in Fig. 1. Tables 2, 3 and 4 contain column headings of recommended *L/D* values for those chimneys having lateral connectors (Fig. 1) as well as for vents and stacks which consist of vertical piping only and have no lateral connection (Fig. 2).

The reader should be forewarned that stack designing by application of the tables given here requires cut-and-try calculation procedures, but by doing so, cut-and-try chimney construction methods may be eliminated.

The following terms and headings in the Tables 2, 3, and 4 should be familiar to users of gas equipment. With the help of some auxiliary tables, the effects of operating variables can be estimated and the height and size of the stack or chimney can be computed with a minimum of effort.

Table 2 — Static draft pressure losses in venting system with 4 per cent CO_2 in the stack gases, inches of water column
(See Table 4 for Energy Losses in Systems Having Draft Hoods)

FOUR PERCENT CO_2		*L/D;* System Length to Diameter Ratio, Feet of Connector and Stack Per Foot of Diameter							
Fig. 2	Vertical Only	45	50	60	70	80	100	120	140
Fig. 1	Connector Used	5	10	20	30	40	60	80	100
Average Temperatures Rise Above Ambient of Gases in Vertical Part of Stack or Chimney, F Degrees Above 60 F Ambient	Input Loading: Btu Per Hour Per Square Inch of Vent Chimney Area: *I/A*								
150 deg	2,000	0.002	0.002	0.003	0.003	0.004	0.005	0.005	0.006
	3,000	0.005	0.005	0.006	0.007	0.008	0.010	0.012	0.014
	4,000	0.009	0.010	0.011	0.013	0.015	0.018	0.022	0.025
	6,000	0.020	0.022	0.025	0.029	0.033	0.041	0.048	0.056
	8,000	0.035	0.039	0.045	0.052	0.059	0.073	0.086	0.100
	10,000	0.055	0.060	0.070	0.081	0.092	0.113	0.134	0.155
	15,000	0.123	0.135	0.159	0.183	0.207	0.254	0.301	0.349
	20,000	0.219	0.240	0.283	0.326	0.368	0.453	0.536	0.622
	25,000	0.343	0.376	0.443	0.510	0.576	0.710	0.840	0.975
	30,000	0.490	0.540	0.634	0.730	0.825	1.02	1.20	1.40
300 deg	2,000	0.003	0.003	0.003	0.004	0.004	0.006	0.007	0.008
	3,000	0.006	0.007	0.008	0.009	0.010	0.012	0.015	0.017
	4,000	0.011	0.012	0.014	0.016	0.018	0.022	0.026	0.030
	6,000	0.024	0.026	0.031	0.036	0.040	0.049	0.059	0.068
	8,000	0,043	0.047	0.055	0.063	0.072	0.088	0.105	0.122
	10,000	0.067	0.073	0.086	0.099	0.112	0.137	0.163	0.190
	15,000	0.151	0.165	0.195	0.224	0.253	0.311	0.379	0.428
	20,000	0.268	0.294	0.347	0.400	0.451	0.555	0.656	0.761
	25,000	0.420	0.460	0.542	0.624	0.705	0.870	1.03	1.19
	30,000	0.600	0.660	0.775	0.894	1.01	1.25	1.47	1.71
500 deg	2,000	0.003	0.004	0.004	0.005	0.006	0.007	0.008	0.010
	3,000	0.008	0.008	0.010	0.011	0.013	0.015	0.018	0.021
	4,000	0.013	0.015	0.017	0.020	0.022	0.027	0.033	0.038
	6,000	0.030	0.033	0.038	0.044	0.050	0.062	0.073	0.085
	8,000	0.055	0.058	0.069	0.079	0.089	0.110	0.130	0.152
	10,000	0.083	0.091	0.107	0.123	0.139	0.171	0.203	0.236
	15,000	0.187	0.206	0.242	0.279	0.315	0.387	0.458	0.531
	20,000	0.334	0.365	0.431	0.496	0.560	0.690	0.816	0.946
	25,000	0.522	0.572	0.675	0.776	0.877	1.08	1.28	1.48
	30,000	0.746	0.822	0.965	1.11	1.26	1.55	1.83	2.12
750 deg	2,000	0.004	0.005	0.005	0.006	0.007	0.009	0.010	0.012
	3,000	0.009	0.010	0.012	0.014	0.016	0.019	0.023	0.026
	4,000	0.017	0.018	0.021	0.024	0.028	0.034	0.040	0.047
	6,000	0.037	0.041	0.048	0.055	0.062	0.077	0.091	0.106
	8,000	0.067	0.073	0.085	0.098	0.111	0.136	0.162	0.189
	10,000	0.104	0.113	0.133	0.153	0.173	0.212	0.252	0.294
	15,000	0.233	0.256	0.302	0.347	0.382	0.481	0.570	0.661
	20,000	0.415	0.455	0.537	0.618	0.698	0.860	1.02	1.18
	25,000	0.650	0.713	0.840	0.968	1.09	1.35	1.59	1.85
	30,000	0.930	1.03	1.20	1.38	1.57	1.94	2.28	2.64
1000 deg	2,000	0.005	0.005	0.006	0.007	0.008	0.010	0.012	0.014
	3,000	0.011	0.012	0.014	0.016	0.019	0.023	0.027	0.032
	4,000	0.020	0.022	0.026	0.029	0.033	0.041	0.048	0.056
	6,000	0.045	0.049	0.057	0.066	0.074	0.092	0.109	0.127
	8,000	0.080	0.087	0.102	0.117	0.133	0.163	0.194	0.226
	10.000	0.124	0.135	0.159	0.183	0.207	0.254	0.302	0.352
	15,000	0.279	0.307	0.361	0.416	0.470	0.577	0.683	0.791
	20,000	0.497	0.545	0.642	0.740	0.835	1.03	1.22	1.41
	25,000	0.779	0.854	1.01	1.16	1.31	1.61	1.91	2.21
	30,000	1.11	1.23	1.43	1.66	1.87	2.32	2.73	3.16

1. *Friction* is represented by the ratio *L/D* where *L* is the total piping length

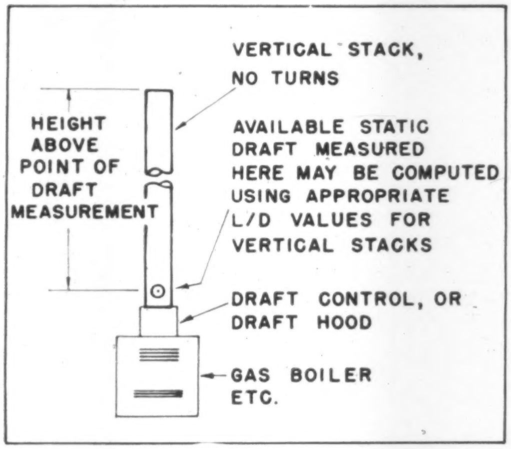
VERTICAL STACK, NO TURNS
HEIGHT ABOVE POINT OF DRAFT MEASUREMENT
AVAILABLE STATIC DRAFT MEASURED HERE MAY BE COMPUTED USING APPROPRIATE L/D VALUES FOR VERTICAL STACKS
DRAFT CONTROL, OR DRAFT HOOD
GAS BOILER ETC.

Fig. 2 — Draft measurement in vertical stack having no horizontal breeching

of connector plus stack, in feet; *D* is the diameter of the connector and stack, in feet (both are assumed to have the same diameter).

The greater the system length for a given diameter, the greater will be the energy losses. Values in these tables for systems having a connector include the effect of the energy losses in a tee, elbow or breeching. For vertical vents (Fig. 2) there is, of course, no connector or tee and $L = H$, or the length of piping is equal to stack height. Where connector and stack or chimney sizes differ, use the smaller area to find *D*, and *L/D*.

2. *Input and cross sectional area* is represented by the ratio *I/A* where *I* is the hourly fuel input or rate of gas consumption, Btu per hour; *A* is the area of connector stack, chimney or vent, square inches.

The ratio *I/A* could be called the input loading or Btu input per square inch of flue area. This factor is frequently used as a basis for gas chimney design and serves to relate heat input to flow velocity. Table 5 converts area to diameter, to assist in the calculations. Where connector area differs from stack or chimney area, the smaller area should be used to determine both the *I/A* and *L/D* ratios.

3. *Average gas temperature rise above ambient* in the vertical stack. This is represented in Tables 2 and 3 by the temperature rises of 150, 300, 500, 750, and 1000 deg in the blocks in the left hand margin. Table 4 for gas vents goes from 100 to 500 deg above room. Energy losses, as shown by the draft equation, increase with temperature due to greater flow velocity. Precise work also requires that average temperature be compensated for cooling in accordance with Table 6. For chimney and vent design, ambient temperature should be chosen as 60 F outdoors. Temperature in the boiler room does not influence chimney operation. If the chimney design is adequate for 60 F operation, any drop in outdoor temperature will improve stack action because of greater difference between stack and ambient temperature. Choice of a lower chimney operating temperature than that actually expected will yield a conservative design, with extra capacity for overloads.

4. *Gas composition or CO_2 concentration* (on a dry basis). The velocity of stack gas flow for a given heat input increases as the CO_2 in the gases decreases, thereby increasing the energy losses at higher amounts of excess air. Table 2 for 4 percent CO_2 and Table 3 for 8 percent, represent 2 common operating conditions of stacks required to produce draft. For other operating conditions, at other values of CO_2, Table 7 can be used to correct the losses in either Table 2 or 4 for 4 percent CO_2. Thus with 12 percent CO_2 obtained during theoretical combustion of natural gas with no excess air, Table 7 shows the draft loss to be 0.137 times that given for 4 percent CO_2, or roughly 1/7 as great due to lowered gas velocity in the system. Two examples of stack design calculations will be given, *viz.* (1) Gas boiler requiring a definite static draft; (2) Gas appliance having a draft hood and thus requiring zero static draft at the inlet of the draft hood, or at the appliance flue outlet.

The following information should be obtained and noted about the

Table 3 — Static draft pressure losses in venting system with 8 per cent CO_2 in the stack gases, inches of water column
(Also Applies If Barometric or Damper Type Draft Control Is Used)

EIGHT PERCENT CO_2		*L/D* System Length to Diameter Ratio, Feet of Connector and Stack Per Foot of Diameter							
Fig. 2	Vertical Only	45	50	60	70	80	100	120	140
Fig. 1	Connector Used	5	10	20	30	40	60	80	100
Average Temperature Rise Above Ambient of Gases in Vertical Part of Stack or Chimney, F Degrees Above 60 F Ambient	Input Loading: Btu Per Hour Per Square Inch of Vent or Chimney Area: *I/A*								
150 deg	2,000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002
	3,000	0.001	0.002	0.002	0.002	0.002	0.003	0.003	0.004
	4,000	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.007
	6,000	0.005	0.006	0.007	0.008	0.009	0.011	0.013	0.015
	8,000	0.010	0.011	0.012	0.014	0.016	0.020	0.024	0.028
	10,000	0.015	0.017	0.019	0.022	0.025	0.031	0.037	0.043
	15,000	0.034	0.037	0.044	0.050	0.057	0.070	0.083	0.096
	20,000	0.061	0.066	0.078	0.090	0.101	0.125	0.148	0.171
	25,000	0.094	0.104	0.122	0.140	0.159	0.195	0.232	0.270
	30,000	0.136	0.149	0.175	0.201	0.227	0.280	0.332	0.384
300 deg	2,000	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002
	3,000	0.002	0.002	0.002	0.002	0.003	0.003	0.004	0.005
	4,000	0.003	0.003	0.004	0.004	0.005	0.006	0.007	0.008
	6,000	0.007	0.007	0.009	0.010	0.011	0.014	0.016	0.019
	8,000	0.012	0.013	0.015	0.018	0.020	0.025	0.029	0.034
	10,000	0.019	0.020	0.024	0.027	0.031	0.038	0.045	0.052
	15,000	0.042	0.046	0.054	0.062	0.070	0.086	0.102	0.118
	20,000	0.074	0.081	0.096	0.110	0.124	0.153	0.182	0.209
	25,000	0.116	0.127	0.150	0.171	0.195	0.239	0.284	0.328
	30,000	0.166	0.182	0.208	0.246	0.278	0.342	0.406	0.470
500 deg	2,000	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.003
	3,000	0.002	0.002	0.003	0.004	0.004	0.004	0.005	0.006
	4,000	0.004	0.004	0.005	0.006	0.006	0.008	0.009	0.011
	6,000	0.008	0.009	0.011	0.012	0.014	0.017	0.020	0.023
	8,000	0.015	0.016	0.019	0.022	0.025	0.031	0.036	0.042
	10,000	0.023	0.025	0.030	0.034	0.039	0.047	0.056	0.065
	15,000	0.052	0.057	0.067	0.077	0.087	0.107	0.127	0.146
	20,000	0.092	0.101	0.119	0.137	0.155	0.190	0.226	0.260
	25,000	0.145	0.158	0.186	0.213	0.242	0.297	0.354	0.408
	30,000	0.215	0.235	0.277	0.317	0.360	0.443	0.526	0.610
750 deg	2,000	0.001	0.001	0.001	0.002	0.002	0.002	0.003	0.003
	3,000	0.003	0.003	0.003	0.004	0.004	0.005	0.006	0.007
	4,000	0.005	0.005	0.006	0.007	0.008	0.009	0.011	0.013
	6,000	0.010	0.011	0.013	0.015	0.017	0.021	0.025	0.029
	8,000	0.018	0.020	0.024	0.027	0.030	0.038	0.045	0.052
	10,000	0.029	0.031	0.037	0.042	0.048	0.059	0.070	0.081
	15,000	0.064	0.070	0.083	0.095	0.118	0.133	0.158	0.182
	20,000	0.114	0.125	0.148	0.170	0.192	0.236	0.281	0.324
	25,000	0.180	0.196	0.231	0.265	0.300	0.370	0.440	0.508
	30,000	0.256	0.281	0.322	0.381	0.430	0.530	0.628	0.730
1000 deg	2,000	0.001	0.002	0.002	0.002	0.002	0.003	0.003	0.004
	3,000	0.003	0.003	0.004	0.005	0.005	0.006	0.008	0.009
	4,000	0.006	0.006	0.007	0.008	0.009	0.011	0.014	0.016
	6,000	0.012	0.014	0.016	0.018	0.021	0.025	0.030	0.035
	8,000	0.022	0.024	0.028	0.033	0.037	0.045	0.054	0.062
	10,000	0.034	0.038	0.044	0.051	0.057	0.071	0.084	0.097
	15,000	0.077	0.084	0.099	0.114	0.129	0.159	0.189	0.212
	20,000	0.127	0.150	0.177	0.204	0.230	0.283	0.336	0.390
	25,000	0.215	0.235	0.277	0.317	0.360	0.443	0.526	0.610
	30,000	0.307	0.337	0.386	0.456	0.515	0.634	0.753	0.870

equipment for which a stack or chimney is required:

1. Heat input, Btu per hour, of fuel gas consumed.
2. Temperature of gases delivered to connector at equipment outlet.
3. CO_2 concentration of gases in chimney or vertical stack. This can depend on whether the draft control acts to bleed ambient air into the stack, or operates an internal movable damper solely to increase resistance, as well as on equipment operational characteristics.
4. Static draft required at the boiler or furnace outlet, or whether there is a draft hood.

For stacks or gas vents installed directly on top of the draft control or draft hood as shown in Fig. 2, available draft, or flow, must be computed using *L/D* values for vertical vents. For systems having lateral connectors care must be taken where Fig. 1 is used, to choose the lower *L/D* line in Tables 2, 3, and 4 in order to obtain proper compensation for connector and fitting resistance losses.

Table 4 — Total draft losses for design of individual gas vent systems having draft hoods to operate at 4 percent CO_2 in the vent gases,[a] inches of water column

FOUR PERCENT CO_2		*L/D*; System Length to Diameter Ratio, Feet of Connector and Stack per Foot of Diameter										
Fig. 2	Vertical Only	5	10	20	30	40	60	80	100	120	140	160
Fig. 1	Connector Used	—	—	—	—	10	30	50	70	90	110	130
Average Temperature Rise Above Ambient of Gases in Vertical Part of Stack or Chimney, F Degrees Above 60 F Ambient	Input Loading: Btu Per Hour Per Square Inch of Vent or Chimney Area: *I/A*											
100 deg	4,000	0.008	0.009	0.010	0.012	0.014	0.017	0.020	0.023	0.026	0.030	0.033
	6,000	0.018	0.020	0.024	0.026	0.031	0.038	0.045	0.052	0.059	0.066	0.073
	8,000	0.032	0.035	0.042	0.048	0.054	0.067	0.080	0.092	0.105	0.118	0.131
	10,000	0.050	0.055	0.065	0.075	0.085	0.104	0.124	0.144	0.163	0.183	0.204
	15,000	0.114	0.122	0.147	0.169	0.187	0.235	0.279	0.323	0.368	0.411	0.460
	20,000	0.202	0.222	0.262	0.300	0.340	0.418	0.497	0.575	0.652	0.731	0.816
	25,000	0.317	0.348	0.410	0.471	0.531	0.655	0.780	0.901	1.03	1.15	1.28
	30,000	0.454	0.498	0.586	0.675	0.760	0.936	1.11	1.29	1.46	1.64	1.83
	40,000	0.810	0.890	1.05	1.20	1.36	1.68	1.99	2.30	2.62	2.93	3.26
200 deg	4,000	0.009	0.010	0.012	0.014	0.016	0.019	0.023	0.027	0.030	0.034	0.038
	6,000	0.021	0.023	0.027	0.031	0.035	0.044	0.052	0.060	0.068	0.076	0.085
	8,000	0.038	0.041	0.049	0.056	0.063	0.078	0.092	0.107	0.122	0.136	0.151
	10,000	0.059	0.064	0.076	0.087	0.099	0.121	0.144	0.167	0.190	0.212	0.235
	15,000	0.132	0.145	0.170	0.196	0.222	0.273	0.324	0.375	0.426	0.476	0.529
	20,000	0.235	0.256	0.303	0.349	0.395	0.486	0.576	0.669	0.760	0.850	0.940
	25,000	0.368	0.404	0.475	0.547	0.620	0.761	0.902	1.05	1.19	1.33	1.47
	30,000	0.526	0.578	0.680	0.782	0.885	1.09	1.29	1.50	1.70	1.90	2.11
	40,000	0.940	1.03	1.21	1.40	1.58	1.94	2.31	2.67	3.04	3.40	3.76
300 deg	4,000	0.011	0.012	0.014	0.016	0.018	0.022	0.026	0.030	0.035	0.039	0.043
	6,000	0.024	0.026	0.031	0.036	0.040	0.050	0.059	0.069	0.078	0.087	0.096
	8,000	0.043	0.047	0.056	0.064	0.072	0.089	0.105	0.122	0.139	0.155	0.172
	10,000	0.067	0.073	0.086	0.099	0.112	0.138	0.164	0.190	0.216	0.242	0.268
	15,000	0.150	0.165	0.194	0.223	0.253	0.311	0.369	0.429	0.485	0.554	0.603
	20,000	0.268	0.294	0.346	0.400	0.450	0.554	0.657	0.761	0.865	0.968	1.07
	25,000	0.420	0.460	0.541	0.623	0.705	0.869	1.03	1.20	1.36	1.52	1.68
	30,000	0.600	0.660	0.775	0.89	1.01	1.24	1.47	1.71	1.94	2.17	2.4
	40,000	1.07	1.18	1.38	1.59	1.80	2.21	2.63	3.05	3.46	3.87	4.30
400 deg	4,000	0.012	0.013	0.016	0.018	0.020	0.025	0.030	0.034	0.039	0.044	0.048
	6,000	0.027	0.030	0.035	0.040	0.045	0.056	0.066	0.077	0.087	0.098	0.108
	8,000	0.048	0.053	0.063	0.072	0.081	0.100	0.118	0.137	0.156	0.175	0.193
	10,000	0.075	0.083	0.097	0.112	0.126	0.155	0.184	0.213	0.242	0.272	0.300
	15,000	0.169	0.186	0.219	0.252	0.284	0.350	0.415	0.48	0.546	0.611	0.678
	20,000	0.301	0.331	0.389	0.448	0.505	0.622	0.740	0.855	0.971	1.09	1.21
	25,000	0.472	0.518	0.610	0.701	0.792	0.975	1.16	1.34	1.52	1.71	1.89
	30,000	0.675	0.741	0.871	1.00	1.13	1.40	1.66	1.92	2.18	2.44	2.70
	40,000	1.21	1.32	1.56	1.79	2.02	2.49	2.96	3.42	3.89	4.36	4.82
500 deg	4,000	0.013	0.015	0.017	0.020	0.022	0.028	0.033	0.038	0.043	0.048	0.053
	6,000	0.030	0.033	0.039	0.044	0.050	0.062	0.073	0.085	0.096	0.108	0.120
	8,000	0.053	0.059	0.069	0.079	0.089	0.110	0.131	0.152	0.172	0.193	0.214
	10,000	0.083	0.091	0.107	0.124	0.139	0.171	0.203	0.236	0.268	0.300	0.333
	15,000	0.187	0.205	0.241	0.278	0.314	0.386	0.458	0.531	0.604	0.675	0.750
	20,000	0.333	0.365	0.429	0.495	0.558	0.688	0.815	0.946	1.07	1.20	1.33
	25,000	0.52	0.572	0.672	0.795	0.875	1.08	1.28	1.48	1.68	1.89	2.09
	30,000	0.75	0.82	0.96	1.11	1.25	1.54	1.83	2.12	2.41	2.70	2.99
	40,000	1.33	1.46	1.72	1.98	2.23	2.75	3.26	3.78	4.30	4.81	5.33

[a] Not recommended for design of systems smaller than 8 in. inside diameter.

If the connector or breeching has 2 elbows as in Fig. 3, the point of draft measurement is as indicated thereon. Available draft at the draft control may be greater or less than that calculated, depending on configuration of the system. The Appendix includes a point-by-point analysis of this specific type of system, when operating as a gas vent, which shows that available static draft at the draft hood outlet is actually less than at the base of the final vertical section.

Table 5 — Conversion from square inches area to round diameter in feet

Area Sq. In., A[a]	Diam, Feet, D	Area, Sq. In., A[a]	Diam, Feet, D
50	0.67	4070	6
113	1	5540	7
254	1.5	7230	8
453	2	9250	9
707	2.5	11300	10
1020	3	25400	15
1800	4	45300	20
2820	5		

[a] $A = 113\ D^2$.

Very frequently a boiler or equipment manufacturer will specify a breeching or connector size which differs from that of the vertical stack. It may be either larger or smaller. The same situation may be encountered when a replacement boiler is connected to an existing chimney. Where there are 2 different piping areas in such instances, simply compute the draft or design the system as previously stated on the basis of:

1. Total lineal feet of piping — connector and stack; and
2. Smaller area, regardless of whether it is the connector, or the vertical stack.

Theoretical exploration of the resistances of connectors, stacks, and breechings, having different sizes indicates that a controlling influence on draft or flow is exerted by losses in that part of the system having the smaller area. If the system losses are figured for the smaller area, actual losses will be slightly less. Thus use of the smaller area for design or draft calculation always yields a conservative design. This is true whether there is a great disparity in sizes, or where they are nearly the same.

Table 6 — Effect of chimney gas temperature upon relative draft losses (based on 300 deg gas temperature rise above 60 F ambient)

Avg Temp Rise of Chimney Gases, F deg	Relative Draft Loss	Avg Temp Rise of Chimney Gases, F deg	Relative Draft Loss
50	0.70	700	1.49
100	0.76	800	1.61
200	0.88	900	1.73
300	1.00	1000	1.85
400	1.12	1200	2.10
500	1.24	1500	2.46
600	1.37	2000	3.08

Effect of cooling of gases in connector, breeching and vertical section: Estimate cooling as

1. Steel connector and stack	4 % per 10 diam
2. Masonry chimney	1 % per 10 diam

L = total lineal feet of piping.

D = smaller diameter in system (or equivalent hydraulic diameter for shapes other than round. Hydraulic diameter = 4 × cross section area/Length of wetted perimeter.

Similarly, the input loading I/A must be found using the smaller area.

Table 7 — Effect of CO_2 concentration upon relative draft losses (use with Table 2 for 4 percent CO_2)

CO_2 Percent in Chimney Gases	Relative Draft Loss	CO_2 Percent in Chimney Gases	Relative Draft Loss
1	14.8	7	0.352
2	3.8	8	0.279
3	1.75	9	0.224
4	1.00	10	0.186
5	0.655	11	0.157
6	0.455	12	0.137

In making these calculations, it is a good idea to allow adequately for changes in such factors as outdoor air temperature, heat input and excess air, by designing for more draft than the minimum required. It is always possible to find some means to reduce draft. But a chimney or stack which is too short will never be able to produce more than a certain amount of draft and one that is undersized will rapidly build up excessive energy losses. Conversely, it is uneconomical to build a stack of excessive height or diameter, which is both costly as well as wasteful of heat.

For a choice of design operation conditions where no other information is available, it is suggested that chimneys or stacks for boilers having draft hoods be designed to operate at 300 F and 4 percent CO_2 using Tables 1 and 4.

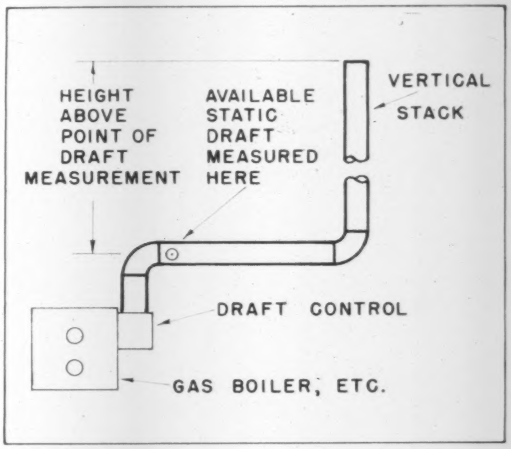
HEIGHT ABOVE POINT OF DRAFT MEASUREMENT
AVAILABLE STATIC DRAFT MEASURED HERE
VERTICAL STACK
DRAFT CONTROL
GAS BOILER, ETC.

Fig. 3 — Draft measurement in a system having two 90 deg turns

For equipment requiring draft, such as steam boilers, design conditions of 500 F at 8 percent CO_2 are suggested, thus Tables 1 and 3 are used.

Rather than using these estimated temperatures, however, it is always preferable to obtain precise draft requirements and flue gas temperatures and compositions from the equipment manufacturer. This will permit more precise design of the proper stack to obtain best equipment operation.

Sample Calculations

Example I — Designing to produce draft.

Problem: Given — A gas furnace of 22,000,000 Btu per hr heat input, which delivers 380 F gases to the connector containing 8 percent CO_2 in the flue products, and the furnace requires 0.10 in. of water column static draft. Ambient temperature is assumed to be 60 F. This furnace has a side outlet (Fig. 1) vent connection and the length of connector will be 20 ft.

Find: *(a) The height of steel stack required; and (b) The diameter of stack required.*

Solution: Refer to Table 1. Assume an average gas temperature rise in the vertical stack of 300 deg, allowing 20 deg cooling from an inlet rise of 320 deg as a first guess, the lowest height to produce 0.10 in. theoretical draft will be 20 ft, at which 0.11 in. H_2O is obtained. This allows only 0.01 in. for losses, which is too slim a margin for operating variations. Thus, try 25 ft of height at which the theoretical draft is 0.13 in.

Proceed to find the losses: With 20 ft of connector and 25 ft of stack height, L = 45 ft. Next, refer to Table 3, 8 percent CO_2. Estimate that L/D will be about 30, using the L/D line for stacks having connectors (always try this value of L/D for the first guess, since it is in about the middle of the Table). In the group of numbers for 300 deg gas temperature rise read down to the value of I/A where the losses are just less than the theoretical draft minus the draft needed. In this case, the losses must not exceed 0.03 in. H_2O. Using Table 3, at

I/A = 10,000, losses = 0.027 in. H_2O

Table 8 — Altitude correction factor for theroretical draft, and for draft losses

At Altitude, Feet	Multiply Draft and Losses By
Sea Level	1.00
2000	0.93
4000	0.86
6000	0.81
8000	0.75

Journal Section

To find stack area, divide input by I/A at which the losses are 0.03 in., thus

$$\frac{22{,}000{,}000}{10{,}000} = 2{,}200 \text{ sq in., which is the approximate stack area needed.}$$

Refer to the auxiliary Table 5. This shows that a 5-ft diameter stack of 2,820 sq in. area might be pretty close.

Next, use the 5-ft diameter to recheck L/D, since the approximate area just found indicates the original L/D assumption to be too high. The corrected value of $L/D = 45/5 = 9$, so use the $L/D = 10$ column to estimate a new value of draft losses.

At 300 deg average gas temperature rise, and $L/D = 10$, (again using Table 3), losses $= 0.020$ at $I/A = 10{,}000$ leaving $0.13 - 0.020 = 0.11$ in. theoretical draft. This shows that the 5-ft diameter is adequate.

Although a stack diameter smaller than 5 ft might be used here, the larger size will be a safer design, due to greater tolerance for operating variations.

As a matter of final interest, it is desirable to check for the effects of cooling. The cooling rate for the steel stack is given in Table 6 with sufficient accuracy as 4 percent per 10 diam, but the distance to the midpoint of the vertical is only 32.5/5 or about 6½ diam, so that cooling is about 3 percent. 320 deg minus 3 percent is 310 deg, so that the average stack temperature will be slightly more than that used for the design estimate, again providing some margin for operating variations.

This same sort of calculation can be applied to any stack or chimney design within the scope of the tables. Interpolation can be used as necessary or curves plotted where needed to permit chimney designs for operation at other temperatures, CO_2 concentrations, or values of I/A or L/D.

Example II—Design for zero draft (where a draft hood is used).

Problem:—Given: A gas boiler of 6,000,000 Btu per hr input, having a draft hood, delivers gases at 480 deg rise above ambient to the draft hood inlet, at 8 percent CO_2 in the boiler flue gases. It is desired to design the stack to operate at a dilution ratio of roughly 2.0 (2 pounds of stack gases per pound of flue gases) meaning that there will be a stack temperature of not over 240 deg above ambient and the stack gases will contain 4 percent CO_2 after dilution at the draft hood. Piping arrangement must consist of a 10-ft lateral connector and 80 ft of height above the connector breeching in order to discharge the stack gases above a nearby building.

***Find:** Stack diameter to produce sufficient flow to properly vent this boiler at the desired dilution ratio.*

Solution: Because the draft hood is used, this system must be designed using Tables 1 and 4 to obtain losses exactly equal to the theoretical draft.

Assume an average temperature of 200 F in the vertical stack, (this allows 40 deg cooling as a first guess) Table 1 shows that theoretical draft will be 0.33 in. at 80 ft. of height.

The diameter and thus the L/D ratio for this system is not known. As a first guess, try $L/D = 30$ using the L/D line for stacks with connectors to find what value of I/A will produce draft losses of 0.33 in. H_2O.

In Table 4, the column for $L/D = 30$ for stacks with connectors shows the following losses:

$I/A = 15{,}000$, losses $= 0.273$ in. H_2O
$I/A = 20{,}000$, losses $= 0.486$ in. H_2O

Interpolating to find the exact value of I/A at which losses $= 0.33$ in.

$$I/A = 15{,}000 + 0.33 - 0.273/0.486 - 0.273 \times 5{,}000 = 16{,}340 \text{ Btu per sq in.}$$

Solving for the stack area, divide input by I/A,

6,000,000 Btu/16,340 Btu/sq in. = 367 sq in. or roughly the area of a 22-in. diam stack

Making a second approximation, on the basis that the 22-in. computed diameter permits finding a corrected L/D,

$$\text{New } L/D = 90 \times 12/22 = 49 \text{ or } 50 \text{ for practical purposes}$$

Again at 200 deg, but in the column for $L/D = 50$ in a stack with a connector, losses $= 0.324$ in. H_2O at $I/A = 15{,}000$. For all practical purposes this is equal to the 0.33 in. of theoretical draft, so the final value of I/A is 15,000 Btu of appliance input per sq in. of stack area.

Computing stack area:

$$A = 6{,}000{,}000/15{,}000 = 400 \text{ sq in.}$$

$$D = \sqrt{400/0.785} = 22.6 \text{ in.}$$

For this stack, a diameter of 23 in. may be used. Because the second approximation changed D by only 0.6 in., it may readily be seen that neither L/D nor diameter would change appreciably upon a third approximation.

Checking cooling for the 23-in. stack to determine whether the midpoint temperature will be below the assumed value, the length of stack to the midpoint is $(10 + 40)12/23$ diam, or 26 diam. The cooling rate is 4 percent per 10 diam. This will produce roughly 11 percent cooling for the steel stack. Eleven percent of 240 is 27 deg, so that $240 - 27$ is 213 deg. This means that the midpoint temperature will be greater than the design temperature, thus assuring adequate stack gas flow.

For vertical stacks, the upper L/D line in Table 4 must be used to find the diameter. Elimination of fitting losses means that a given diameter of straight vertical stack is capable of carrying more flow, or conversely for any value of static draft loss, the permissible L/D is much greater. The difference in the L/D headings for stacks with and without connectors shows that elimination of the tee makes a difference of one velocity head or 30 L/D.

In case there is any doubt as to whether the stack will be vertical or have fittings, it should be designed as a system with fittings and having a connector. Should some or all of the fittings be eliminated, the added flow will not impair operation.

The 2 examples just discussed, illustrate how the draft equation may be solved quickly by cut-and-try methods and simple interpolation. A few trials will permit rapid estimation of stack, chimney, or vent sizes with very little effort, as the user becomes familiar with the process of making educated guesses. The method of solution results in convergence so that even if the first guess for L/D is way off, using the results in the second trial will yield a reasonably close answer.

Conclusion

A simple, general method of tabulating parameters of gas equipment chimney operation has been developed which permits rapid design of vents, stacks and chimneys for all types of gas equipment. The method applies irrespective of draft or chimney efficiency requirements. Thus vents for gas appliances having a draft hood may be designed as readily as high large diameter chimneys for large industrial gas furnaces or boilers, requiring strong stack draft.

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Effect of Heated-Floor Temperatures on Comfort

By Ralph G. Nevins* and Arthur O. Flinner,** Manhattan, Kans.

SUMMARY — For the first phase of a study to determine the effect of floor temperatures on comfort, comfort data were obtained by subjecting college age students, male and female, seated at rest, to various floor-panel-heated environments for periods of 60 min. A total of 108 male and 21 female students were used. Correlation coefficients were calculated for the correlation of comfort vote with air temperature, operative temperature, effective temperature, air temperature plus mean radiant temperature, floor temperature and relative humidity. The coefficients show that the comfort vote correlates with those parameters in which air temperature is a predominate factor. The comfort vote did not show a significant correlation with floor temperature or relative humidity.

Floor surface temperatures over a range of 65 to 95 F were found to have a negligible effect on the comfort vote when the air temperature was 75 F. During the 1957 tests, using male subjects, it was found that floor temperature of 100 F significantly affected the comfort vote whereas floor temperatures of 80 to 95 F did not. It was concluded that 95 F is the maximum floor temperature for comfort under the conditions of these tests. Foot temperatures recorded at the end of the 60-min exposure indicate that 88 to 91 F is the maximum foot temperature for comfort under the conditions of these tests.

The second phase of this program will be undertaken to determine the effect of floor surface temperature on comfort when the exposure period is 3 hours with the subjects both seated at rest and standing doing light work.

WITH INCREASED interest during the past 10 years in the use of floor-panel-heated residences and buildings, the effect of the floor surface temperatures on comfort has been the subject of discussion and research. At Kansas State College, beginning in 1950, a series of experiments were undertaken to determine the effect of floor surface temperatures on the sensation of comfort. This paper deals with the first phase of the program. It is concerned with the subjective reactions of college age students, both male and female, to various floor-panel-heated environments when the exposure period is 60 min and the students are seated at rest.

An exposure period of 60 min was selected for the experiments conducted during the first phase for 2 reasons: (*a*) the tests would provide comfort data for those applications where the period of occupancy was relatively short and of the order of 60 min, and (*b*) the period of 60 min made it possible to schedule the experiments during regular class periods which allowed a greater number of students to participate. It was also considered that these short time tests would be used as a guide in planning long time tests for the research program's second phase.

The second phase of the study will be undertaken during the winter of 1957-58 and will be concerned with the reactions of college age students to floor-panel-heated environments when the exposure period is 3 hr. The second phase program will include tests to evaluate the effect of floor temperatures on comfort for people seated at rest and standing doing light work.

Floor Temperatures In Practice: The design criteria in use today, in the United States, limit the floor surface temperature for floor-panel-heated installations to a maximum of 85 F[1]. Since the panel surface temperature determines the heat output of a given floor panel, a temperature of 85 F restricts the use of a floor-panel-heated system to those regions of the United States with moderate design temperatures. Even in these localities, buildings with large exposed glass areas require a supplemental heating system. A survey of a floor-panel-heated residence in Manhattan, Kans., on a day when the outside temperature was 5 F showed floor surface temperatures 88 F in the kitchen and 90 F in the bedrooms. This residence had an average amount of window area and had been constructed in about 1952.

The limiting temperature of 85 F seems to have been based on some experimental evidence but mostly it seems to have been an arbitrary figure. In 1949, Herrington and Lorenzi published a conclusion that floor temperatures above 75 F were not desirable[2]. This conclusion was based on the physiological consideration regarding the maintenance of a high vascular tone in the lower extremities.

Recent research in this field by F. A. Chrenko[3] in England indicates that floor surface temperatures should be limited to 75 to 77 F,

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[1] Exponent numerals refer to References.

especially if the occupants of the space are likely to be walking about for long periods. This conclusion was based on laboratory experiments using 5 men and 3 women with an exposure period of 60 min. Using a 10 percent incidence of discomfort the maximum desirable floor surface temperature for women sitting was 79 F and for men sitting was 84 F. For both men and women subjects, walking about, the maximum floor surface temperature was 80 F. Chrenko's results were in general agreement with present practice in England which is to limit floor surface temperatures to 75 F.

At the International Conference on Heating, Ventilating and Air Conditioning, held in Paris in 1955, F. C. Marechal presented a paper dealing with the permissible temperatures for ceilings and floors[4]. The experiments conducted in France by Marechal and more recently by Missenard were discussed. In Marechal's experiments using 2 subjects, the maximum foot temperature which the subjects could endure for long periods of time without discomfort was 87.8 to 88.7 F. Data were presented giving the air temperature as a function of floor temperature with the percentage of subjects expressing discomfort as a parameter, the latter also being correlated with the foot temperature. It is interesting to note that for a floor temperature of 75.2 F the air temperature which gives zero percent discontent is, from the American viewpoint, a chilly 63 F (by Marechal) or 68 F (by Missenard). For a floor temperature of 80.6 F the resulting air temperatures would be 60 or 64 F. It was indicated that comfort can be achieved by maintaining the temperature of the foot below 87 F and this can be accomplished by the proper combination of floor surface and air temperature.

Research at Kansas State College: To study the effect of floor surface temperatures on the comfort sensations of college age subjects, comfort data have been obtained using 108 male and 21 female college students. The male students ranged in age from 18 to 31 years with an average age of 22.9 years. The female students ranged in age from 19 to 22 years with an average of 19.7. The data were obtained by subjecting groups of approximately 20 to 25 students to various environments beginning in 1950. The data from each group were analyzed statistically.

Experimental Routine

The subjects were exposed in a psychrometric room to each test environment for periods of 60 min. The subjects reported to the test room at least one hour after their last meal and directly from class or their lodging. Except for the 1954-55 tests, the subjects were not formally acclimated to some neutral environment before entering the psychrometric room. During the 1954-55 tests, the subjects were seated in an adjoining office for 30 min preceding the tests to allow them to become somewhat acclimated to inside conditions. The subjects wore medium weight clothes and were tested 2 at a time.

The comfort sensations were obtained using a 7-point comfort scale shown as follows:

1. cold
2. cool
3. slightly cool
4. comfortable
5. slightly warm
6. warm
7. hot

A thermocouple was placed on the ball of the subjects foot and for the 1953-55 tests an additional thermocouple was placed on the index finger.

Subjects were instructed prior to the tests regarding the use of the comfort scale and the test procedure. The subjects remained seated with their feet resting on the floor throughout the test period and either read or studied. The subjects were seated in chairs which were located in the same position for each test. The chairs were in thermal equilibrium with the surroundings for each test. Comfort votes and other data were recorded at 15-min intervals.

The psychrometric room is a room 10 ft on a side with a 10-ft ceiling located within a larger room. The temperature of the floor and of one wall can be controlled independently from the air or other surface temperatures. Air is introduced into the psychrometric room through ventilation panels located in the ceiling and can be heated or cooled. The air exhausts through slots located around the edge of the room. Previous measurements indicated that the air velocity was less than 40 fpm below the 8-ft level and at the 4-ft level was less than 25 fpm. All surfaces of the psychrometric room were painted a flat machine grey.

Measurement of Physical Data: The temperatures of the floor panels in the psychrometric room were measured by copper-constantan thermocouples taped to the center of the 5 floor panels nearest the outlet header and to the center of the 5 floor panels nearest the inlet header. The floor surface temperature was assumed to be the average of the 10 temperature readings.

The air temperature in the psychrometric room was measured by shielded thermocouples located 6 in. from the ceiling, 5 ft from the floor, and 6 in. from the floor. These 3 thermocouples were located on a vertical line above a point 4 ft from the west wall and on the east-west center line of the floor. For the determination of the mean radiant temperature, an 8-in. diam globe thermometer was placed at the center of the room 5 ft above the floor. Surface temperatures of the walls and ceiling were determined by sets of 5 copper-constantan thermocouples connected in parallel. The velocity of the psychrometric room air was measured at the center of the room 4 ft above the floor.

Test Conditions: The environment to which the subjects were exposed was determined by floor temperature and an air temperature. Air temperatures of 65, 70, 75, 80, and 85 F and floor surface temperatures of 65, 70, 75, 80, 85, 90, 95, and 100 F were used. The temperatures of the room surfaces other than the floor could not be controlled and therefore varied somewhat with each condition. However, before data were taken, these surfaces were allowed to reach an equilibrium condition and the temperatures of these surfaces were usually within ±3 F of the air temperature.

The dew-point in the psychrometric room could not be regulated and therefore the relative humidity to which the subjects were exposed varied from 30 to 60 percent. It has been shown that the effect of relative humidity on comfort[†] in the range of dry-bulb temperatures from 73 to 77 F is overemphasized by the ASHAE Comfort Chart[5,6]. Likewise the data obtained from these tests show that for an air temperature of 75 F and floor surface temperature of 75 or 80 F, the effect of relative humidity could not be detected throughout a range of relative humidities of 30 to 60 percent (See Table 2). On this basis the effects of the relative humidity on the comfort sensation were assumed negligible.

Table 1—Comfort vote at the end of a 60-minute exposure for male college students seated at rest 1950-51 and 1954-55 tests

Air Temp	Floor Temp	No. of Subjects	Final comfort Vote	Standard Deviation
65	75	25	2.87	0.586
65	85	31	3.1	0.854
65	95	6	2.6	0.548
70	65	14	3.1	0.500
70	70	5	3.4	0.500
70	75	7	3.7	0.458
70	80	10	3.5	0.424
70	85	11	3.5	0.346
70	90	11	3.3	0.648
70	95	44	3.7	0.500
75	65	16	3.7	0.400
75	70	4	3.8	0.245
75	75	39	3.9	0.387
75	80	6	3.7	0.346
75	85	39	3.9	0.400
75	90	5	3.9	0.141
75	95	38	3.98	0.346
80	65	16	4.2	0.316
80	70	6	4.0	0.0447
80	75	7	4.6	0.519
80	80	7	4.2	0.173
80	85	5	4.2	0.436
80	90	2	4.0	0.000
80	95	3	4.3	0.300
85	65	16	4.98	0.872
85	70	2	4.88	1.020
85	75	33	5.22	0.854
85	80	4	4.42	0.663
85	85	36	5.13	0.775
85	90	3	4.57	0.490
85	95	34	5.56	0.755

Results: The comfort votes recorded by college age males at the end of a 60-minute exposure to environments represented by the air temperature and the floor temperature are given in Table 1 for tests conducted during 1950-51 and 1954-55. The vote shown is the mean vote for the group of subjects exposed to a particular environment. As an index of the correlation of thermal sensation with parameters such as air temperature, floor temperature, effective temperature and operative temperature, the correlation coefficients were calculated and are tabulated in Table 2. It should be noted that these coefficients hold only for the conditions covered in these tests.

Table 2—Correlation coefficients for comfort vote with various physical parameters for college age men seated at rest, 60-min exposure 1950-51 and 1954-55 tests

Comfort Vote	Coefficient
With Air Temperature	$r = 0.91$
With Effective Temperature	$r = 0.9395$
With Operative Temperature	$r = 0.9272$
With Floor Temperature	$r = 0.0341$[a]
With Floor Temp Air Temp = 75	$r = 0.184$
With Floor Temp Air Temp = 70	$r = 0.31$
With Floor Temp Air Temp = 80	$r = 0.046$
With Floor Temp Air Temp = 85	$r = 0.197$
With Relative Humidity	$r = 0.0462$[b] $r = 0.0688$[c]

[a] All air temperatures considered.
[b] Spring 1950 tests only.
[c] 1957 tests, air temperature 75 F.

The correlation coefficient is an index which expresses the dependency of one variable on another when the relationship between them is assumed linear. The correlation coefficient can have a range of values from +1.0 through 0.0 to −1.0. A value of r equal to 1.0 indicates that all the observed values lie on the least squares line, *i.e.*, the points lie in a straight line when one variable is plotted against a second variable. An r value equal to zero indicates complete independence of the 2 variables. The least-squares line in this case is parallel to the abscissa. A negative correlation coefficient indicates that the dependency is opposite to that assumed in calculating the correlation coefficient.

For college age females exposed for 60 min. to floor-panel-heated environments, the comfort votes (using the scale given under the heading "Experimental Routine" of this paper) at the end of the exposure period are given in Table 3. The correlation coefficients for the correlation of mean comfort vote with the various parameters, as just listed, are given in Table 4.

During January of 1957, a series of tests was undertaken using a constant air temperature of 75 F with floor temperatures of 80, 85, 90, 95 and 100 F. The results obtained from these tests are tabulated in Table 5. In addition to the final comfort vote, the final foot temperatures are recorded. These values are the means for the 27 subjects. Statistical analysis[*] of the data from this experi-

Table 3—Comfort vote at the end of a 60-min exposure for college age females, seated at rest 1953-54 tests

Air Temp	Floor Temp	No. of Subjects	Final Comfort Vote	Standard Deviation
65	75	19	2.6	0.66
65	85	16	2.9	0.69
65	95	18	2.8	0.61
75	75	22	4.1	0.73
75	85	22	4.0	0.29
75	95	17	4.1	0.78
85	75	18	4.8	0.55
85	85	22	5.1	1.01
85	95	19	6.5	0.75

Table 4—Correlation coefficient for comfort vote with various physical parameters for college age females, seated at rest, 60-min exposure 1953-54 tests

Women 1953 Tests Comfort Votes with	Coefficient
Air Temp	$r = 0.93$
Floor Temp	$r = 0.22$
Effective Temp	$r = 0.93$
Operative Temp	$r = 0.95$
Air Temp + MRT	$r = 0.94$

Table 5—Comfort vote and foot temperatures at the end of a 60-min exposure for college age males, seated at rest at air temp 75 F

Floor Temp	Final Vote	Final Foot Temp
80	3.750	87.9
85	3.746	87.8
90	3.696	91.89[a]
95	3.836	91.9
100	4.027[a]	93.3[a]

[a] Increase statistically significant.

[†] *Editor's Note*: The whole subject of comfort-in-air is being studied, and a project is under way at the Society's Laboratory to re-evaluate the comfort charts.

[*] Statistical work performed by the Kansas State College Statistical Laboratory.

ment showed that over a range of floor temperatures of 80 to 95 F for subjects seated at near basal conditions, the differences in comfort vote were not statistically significant and on this basis the differences were not due to the variation in floor temperature. The increase in comfort vote with a floor temperature increase from 95 to 100 F was statistically significant indicating that the subjects could definitely detect an increase in floor temperature to 100 F.

The analysis of variance method[7] used in analyzing these data also showed that a quadratic equation would best fit the data indicating a sudden increase in vote with floor temperatures above 95 F.

Analysis of the foot temperatures was not as conclusive as the analysis of the vote data. However on a statistical basis, the significant differences in foot temperatures occur between floor temperatures of 85 to 90 F and between 95 to 100 F for a constant air temperature of 75 F. There was no definite correlation between foot temperature and comfort.

Statistical analysis of the 1950-51 tests using male students and the 1953-54 tests using female students led to conclusions similar to those previously given. For both male and female subjects varying floor temperatures did not significantly affect comfort votes when the air temperature was 75 F. The range of floor temperatures for these tests was 75 to 95 F. With the air temperature 5 to 10 F higher or lower than 75 F, the comfort votes were affected only slightly.

Discussion

The heat transfer from and to the human body when exposed to various environments is affected by 4 major environmental factors, namely, air temperature, mean radiant temperature, relative humidity and air motion. During this investigation the latter 3 factors were either held constant or were shown to have negligible effect on the comfort votes obtained.

The air motion was held below a minimum value at the occupied level so that the effect of this factor on the results was the same for all test conditions. The effect of relative humidity on the comfort votes has been discussed. As a check on the assumption concerning relative humidity, the correlation coefficient for the correlation of comfort vote with relative humidity was calculated. A value of 0.0688 was obtained indicating negligible correlation.

The mean radiant temperature affects the heat transfer by radiation to and from the body. In these investigations the MRT variation was due mainly to the floor surface temperature variations, one of the parameters of these tests. The effect of the floor temperature is therefore an indication of the effect of a variation in MRT for a constant air temperature except that the warm floor will also supply heat to the feet by conduction and will thereby raise the foot temperature. A variation in floor surface temperature of 10 F results in an increase in MRT, measured at the center of the room, of approximately 4 F assuming all other temperatures in the psychrometric room remain constant.

The data which are tabulated in Table 1 are shown in Fig. 1. The *least-squares* line[8] has been computed and is shown on the graph. Although the calculated line exhibits a slight variation of comfort vote with floor temperature, the statistical analysis shows that this variation is not significant, *i.e.*, the variation shown is probably due to variations within the sample and not due to true variations. This conclusion is further supported by the calculation of the correlation coefficients.

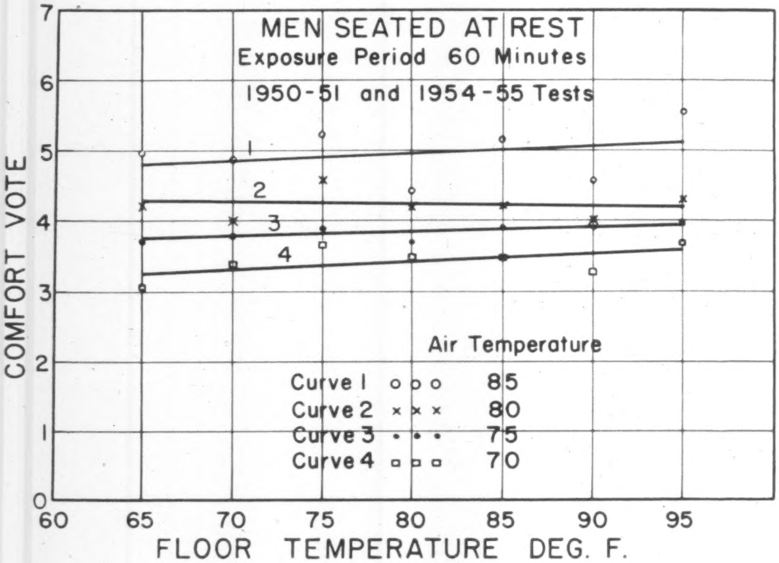

Fig 1—Effect of floor surface temperature on comfort

The data for the female students have not been shown since each air temperature has but 3 floor temperatures associated with it. However, the statistical design of the experiment was such that the data could be treated and the results led to similar conclusions.

Correlation coefficients of 0.90 or greater shown in Tables 2 and 4 indicate that the comfort vote can be considered a function of air temperature or of any of those parameters in which air temperature is a major factor. These data also show that the comfort vote is affected little if any by the floor surface temperature over a range of floor temperatures of 75 to 95 F. These conclusions are limited to the conditions of these tests.

The effect of floor temperature on foot temperatures was found to be variable among the various subjects even when the subjects were wearing similar footwear. The footwear for the male students usually consisted of cotton socks and leather oxfords. For the female students, the footwear consisted of cotton anklets with loafers or saddle shoes, no high heeled shoes. For most of the experiments, the subjects were not subjected to a formal pre-test adaption period. However, for the majority of the tests, and in particular those tests conducted in 1957, the subjects reported to the test room from classes in the engineering building so that the majority of the subjects had been adapted to the environment maintained for the building.

The data given in Table 5 are considered representative and indicate foot temperatures of the order of 88 to 91 F for subjects who are comfortable, seated at rest in an environment for 60 min. The temperatures given are the means of the temperatures recorded at the end of the test period. These temperatures are 1 to 4 deg higher than the temperature of 87 F suggested by Marechal as the maximum for comfort.

The foot-finger temperature difference was investigated during the tests using female subjects. The data were analyzed to determine if a relationship might exist between comfort vote and foot-finger temperature difference. The variation of results between subjects was inconstant and no conclusions could be formulated. The means of the data did exhibit a pattern which is shown in Table 6 indicating a positive foot-finger temperature difference for a warm floor and cool air, and negative values for a cool floor and warm air. In warm air the skin temperature is increased to increase the heat loss and in cool air the opposite effect occurs. With a warm floor the foot temperature would tend to increase and with cool floors the foot temperature would tend to decrease.

It should be emphasized that the data and conclusions are limited to the test conditions maintained during the first phase of this program, namely, subjects seated at rest with an exposure period of 60 min. The second phase of this program will be undertaken to determine the effect of floor surface temperature on comfort for subjects seated at rest when the period of exposure is 3 hr. Also a study will be undertaken to determine the effects of floor temperature on standing subjects performing light work such as the housewife at the kitchen sink or the lathe operator in a factory.

Table 6—Foot-finger temperature difference for female subjects seated at rest[a]

Floor Temp Fahr	Air Temp Fahrenheit		
	65	75	85
75	−0.33	−3.04	−5.36
85	+6.23	−0.70	−1.99
95	+7.12	+0.16	−1.14

[a] Test period 60 min.

Conclusion

Using 108 male and 21 female college students, the effect of floor surface temperature on the comfort votes was found to be negligible in a range of floor temperatures of 65 to 95 F when the subjects were seated at rest in an environment with a 75 F air temperature and with a period of exposure of 60 min. During the 1957 tests, using male students, it was found that the floor temperature of 100 F influenced the comfort vote although the actual value of the vote indicated comfort. From this information it is concluded that 95 F is the maximum for comfort under the conditions of these tests.

Statistical analysis of the data shows that the comfort vote could be correlated with air temperature, operative temperature, effective temperature and air temperature plus mean radiant temperature. This is mainly due to the use of air temperature in each of these parameters and, for the conditions used in these tests, the air temperature is the predominate factor influencing the subjects' reaction to the environments. Analysis of the 1957 data show significant differences among subjects. These differences could be accounted for in the analysis used and the conclusions given are justified.

Foot temperatures recorded at the end of the 60-min exposure period indicate that 88 to 91 is the maximum foot temperature for comfort under the conditions of these tests.

The results of these investigations cannot be used to predict the effect of floor temperatures on comfort when the period of exposure or occupancy is greater than 60 min or when the occupants are not seated with the body at near basal conditions. It is hoped that the second phase of this program will provide data for exposure periods of 3 hr with the occupant seated or standing doing light work.

Acknowledgment

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Pittsburgh Gateway Center, *The City of Tomorrow*

64th Annual Meeting Includes Symposiums, Topical Session

As with all Society meetings the 64th Annual Meeting will have an outstanding program of technical sessions crammed with subjects of interest to all in the profession. Symposiums, a Topical Session, and outstanding papers of timely interest form the substance of the sessions planned for the 64th Annual Meeting of the Society, January 27, 28, 29, 1958 in Pittsburgh, Pa. at the Penn-Sheraton Hotel. In addition the Council and various committees will meet between January 25 and 29 with the organization meeting of the 1958 Council on January 30.

The traditional introduction and installation of the 1958 officers and the presentation of the Past President's Award are among the highlights of the Annual Banquet which will take place on January 29.

Throughout the period of the 64th Annual Meeting there will be many special events for Society members, their families and friends, according to Pittsburgh Chapter Pres. E. H. Reismeyer, Jr. Details and plans are now being developed by the Pittsburgh Chapter Committee on Arrangements under the general chairmanship of T. F. Rockwell. Assisting Mr. Rockwell are D. W. Loucks, vice chairman, and R. B. Stanger, honorary chairman. In addition to the Annual Banquet the committee expects to offer a Get-Together Party, a Welcome Luncheon and special events for the ladies.

Papers and Symposiums

The Program and Papers Committee, of which John Everetts, Jr., Philadelphia, Pa., is chairman, is planning on 7 sessions and 2 symposiums. One session of 4 papers is expected to be organized as the Topical Session on the *Utilization of Solar Energy*. Tentatively 2 simultaneous technical sessions are to take place on Tuesday and Wednesday mornings with the last 2 sessions running concurrently on Wednesday afternoon. The opening of the 64th Annual Meeting on Monday morning will be the only session on that day.

Some of the subjects which may be covered by papers presented at these sessions are: (1) a survey to learn how much airborne dust is in the air in various cities and what the nature of the dust is; (2) the effect of cold ceilings on the feeling of comfort; (3) study of comfort with heated floors; (4) characteristics of multi-louvered dampers; (5) development of a sensitive anemometer for measuring air movement at very low speeds; (6) determination of chimney draft; (7) heat transfer of gravity flow cooling coils; (8) report on electric analogue as a means of predicting heating load.

Two Symposiums

The Symposium on *High Temperature Hot Water* is being arranged by P. N. Vinther, Dallas, Tex., member of the Council, and it will cover the categories of economic evaluation, marine application, military installation design, civilian airport installations, and British and European methods.

Economic evaluation will include objectives, problems and possible solutions, comparative costs of high temperature hot water and steam. Maintenance and operation, personnel required, summary of costs, the future for high temperature hot water and some recommendations will be discussed.

The marine application information is expected to have a world-wide approach as it is planned to include information obtained through conversations with some of Europe's outstanding naval architects.

Military installation design difficulties will be brought out in this analysis of problems confronted and justification for high temperature hot water after comparison with steam. Initial, operating and maintenance costs, equipment selection and other topics will be considered.

Civilian airport installations of heating and air conditioning are increasing as existing airports are ex-

Mellon Square Park, an oasis of trees, fountains and waterfalls

panded and new ones constructed. This topic will be approached by example and analysis, concluding with a discussion of the use and potential expanded use of high temperature hot water.

The final topic of this symposium is planned as a presentation of British and European methods of approaching many views previously presented.

W. G. Hole, Montreal, Que., member of the Council, is organizing the Symposium on *School Heating and Air Conditioning* which will include an educator's viewpoint; design practice, economics; state board problems; and an architect's look into the future.

The educator's viewpoint will take into consideration improving efficiency in classroom instruction, defining classroom environment, how to make the building work for the teacher, and mechanical year-round air conditioning plus artificial light.

Design practice will be primarily concerned with the problems, changing theories, and applications in planning for classroom cooling throughout the year.

Economics is intended to cover figures indicating that air conditioning improves student efficiency, productivity and health. Prediction of more air conditioning in schools will be elaborated on by discussing physiological reactions and economics.

State board problems, such as local financing, state subsidy, and procedures for applying for and obtaining such aid will be considered under this topic. Also a description of the function of the Pennsylvania State Department of Public Instruction in school building programs.

An architect's look into the future, concluding comments of this symposium, are expected to be an expression of viewpoint on developments in schools of the future.

Reservations and Rates

Hotel reservation forms have been mailed to all members and promptness is recommended in securing the accommodations wanted. Typical railroad and air rates to Pittsburgh from chapter cities are published in the JOURNAL this month to further assist Society members planning to attend the 64th Annual Meeting, January 27-29, 1958 at the Penn Sheraton Hotel.

Typical Transportation Rates* to Pittsburgh, Pa., from Chapter Cities

CITY	ROUND TRIP BY AIR	1ST CLASS ROUND TRIP BY RAIL	ONE WAY ROOMETTE
Albany, N.Y.	$ 44.75	$ 62.75	$16.20
Albuquerque, N.M,	183.99	131.45	29.15
Atlanta, Ga.	67.22	82.25	13.25
Austin, Tex.	160.58	136.70	24.75
Baltimore, Md.	24.65	33.30	8.10
Baton Rouge, La.	126.22	88.55	18.65
Battle Creek, Mich.	59.50	45.50	8.10
Boston, Mass.	61.68	64.80	10.55
Buffalo, N.Y.	27.62	60.25	16.20
Charlotte, N.C.	47.02	62.45	16.20
Chicago, Ill.	51.28	51.05	8.10
Cincinnati, Ohio	35.24	34.35	8.10
Cleveland, Ohio	16.43	14.96	$1.15† 8.10
Columbia, S.C.	57.32	69.75	16.20
Columbus, Ohio	20.49	21.74	8.10
Dallas, Tex.	138.60	97.00	21.70
Dayton, Ohio	28.61	29.55	8.10
Denver, Colo.	158.70	111.25	23.25
Des Moines, Ia.	87.71	67.70	13.25
Detroit, Mich.	28.61	33.15	8.10
Edmonton, Canada	239.98	153.75	32.85
El Paso, Tex.	189.60	136.55	29.15
Greensboro, N.C.	37.52	55.15	16.20
Hartford, Conn.	51.38	54.70	9.55
Houston, Tex.	150.78	106.75	23.25
Indianapolis, Ind.	41.58	41.15	8.10
Jackson, Miss.	106.56	78.35	19.70
Jacksonville, Fla.	85.93	93.75	18.65
Johnstown, Pa.	9.40	8.74	1.15†
Kansas City, Mo.	94.84	74.20	14.40
Little Rock, Ark.	103.55	73.60	16.00
Los Angeles, Calif.	261.85	184.10	40.20
Louisville, Ky.	45.64	43.60	8.10
Lubbock, Tex.	$162.66	119.45	$21.70
Memphis, Tenn.	86.53	64.70	14.40
Milwaukee, Wis.	55.04	51.05	11.39
Minneapolis, Minn.	86.13	70.85	13.25
Montreal, Canada	92.96	78.75	16.20
Newark, N. J.	40.69	47.00	8.10
New Orleans, La.	116.82	90.15	18.65
New York, N.Y.	40.69	47.95	8.10
Norfolk, Va.	40.99	50.70	16.20
Oklahoma City, Okla.	122.17	93.25	19.20
Omaha, Neb.	101.47	76.70	14.40
Ottawa, Canada	81.18	54.00	16.20
Peoria, Ill.	66.03	54.40	10.55
Philadelphia, Pa.	31.58	38.75	8.10
Phoenix, Ariz.	226.21	167.40	35.90
Portland, Ore.	265.20	171.45	40.20
Sacramento, Calif.	261.85	184.10	40.20
St. Louis, Mo.	68.21	66.70	10.55
Salt Lake City, Utah	211.46	140.70	29.15
San Antonio, Tex.	166.22	114.05	25.85
San Francisco, Calif.	261.85	184.10	40.20
Seattle, Wash.	265.22	171.45	40.20
Shreveport, La.	123.16	88.55	19.70
Spokane, Wash.	238.69	151.65	40.20
Springfield, Mass.	51.38	57.25	16.20
Syracuse, N.Y.	52.08	78.60	16.20
Toledo, Ohio	27.13	27.04	8.10
Toronto, Canada	37.52	34.40	16.20
Tulsa, Okla.	109.20	85.70	17.65
Vancouver, Canada	280.27	171.45	40.20
Washington, D. C.	24.65	33.30	8.10
Wichita, Kans.	116.82	87.90	19.20
Winnipeg, Canada	140.68	98.50	21.35

*Above rates subject to 10% tax; also subject to change without notice. †Seat, one way.

Society Nominations for 1958

The Nominating Committee, which was selected as provided in Article VIII — *Section 3* of the Society's By-Laws, has submitted its nominees for Officers and members of the Council for 1958, and the Council, in accordance with Article VIII — *Section 4*, has announced its nominees for election to the Committee on Research. Proxy ballots containing the names of the candidates will be sent to the membership prior to the Annual Meeting in January.

Report of Nominating Committee

President
E. R. Queer, University Park, Pa.

First Vice President
A. J. Hess, Los Angeles, Calif

Second Vice President
W. A. Grant, Syracuse, N. Y.

Treasurer
John H. Fox, Toronto, Ont., Canada

Members of Council (*Three-Year Term*)
F. H. Faust, Bloomfield, N. J. (Region 1)
Fred Janssen, Denver, Colo. (Region 3)
*J. W. May, Louisville, Ky. (Region 5)
G. B. Priester, Baltimore, Md. (Region 5)

Respectfully submitted,

NOMINATING COMMITTEE
B. L. Evans, *Chairman*
J. S. Locke, *Secretary*

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*Regional Director.

Nominees for Committee on Research

The election of the Committee on Research is governed by the By-Laws for the election of Officers, with the exception that members of the Committee on Research are nominated by the Council.

In accordance with the provision of **Article VII** — *Section* 3 (*h*) the Council announces the nomination of the following members of the Committee for election to succeed those members whose present terms expire January 1958.

Committee on Research (*Three-Year Term*)
P. R. Achenbach, Washington, D.C.
S. F. Gilman, Syracuse, N. Y.
N. B. Hutcheon, Ottawa, Ont., Canada
R. M. Stern, Seattle, Wash.
H. E. Ziel, Detroit, Mich.

By-Law Provisions on Nominations and Voting

Article VII—*Section 3,* General Committees. ....
(*h*) *Committee on Research,* consisting of fifteen (15) MEMBERS, nominated by the Council or as provided in **Article VIII**, *Section 4,* and elected by the Society in the manner of elected officers. ....

Article VIII— *Section 3.* **Nominating Committee.** The Nominating Committee, to serve for a term of one (1) year from the opening of the Annual Meeting, shall consist of eleven (11) MEMBERS and sixteen (16) alternate MEMBERS, all of whom shall have been in good standing as MEMBERS for a period of at least five (5) years. Four (4) members and one (1) first alternate and one (1) second alternate member of the said committee, each from a different Regional Area, shall be selected by the Council at or prior to its last quarter-annual meeting; and one (1) member and one (1) first and one (1) second alternate member shall be selected by each Chapters Regional Committee, and certified to the Executive Secretary by September 1 of each year. No member of the Council shall be eligible to serve on the Nominating Committee, and no Chapter shall be represented on the said committee by more than one (1) of the eleven (11) MEMBERS. The Nominating Committee so chosen shall effect its own organization during the Annual Meeting of the Society, and shall hold a meeting during the Semi-Annual Meeting of the Society. By September 1 of each year the Nominating Committee shall nominate candidates for the elective offices, the members of the Council and the Regional Directors to be elected at the ensuing Annual Meeting, and notify the Executive Secretary of the names of the nominees, the notice to be accompanied by the written acceptances of the candidates. Seven (7) members entitled to vote on the said committee shall constitute a quorum. No alernate member may be present at committee meetings, nor shall he participate in the deliberations thereof or vote therein except in the absence of the member, or the member and the first alternate member of the one of the eight (8) groups with which he was selected. The transportation expenses, as defined by the Council, of eleven (11) committee members who participate in the deliberations at the annual and semi-annual meetings of said committee shall be included in the budget and defrayed by the Society.

Section 4. **Other Nominations.** Nominations of officers and members of the Council, other than those nominated by the Nominating Committee, and nominations of members of the Committee on Research, other than those nominated by the Council, may be made in writing by at least fifty (50) members eligible to vote, upon presentation of such nominations, with each nominee's consent, to the Executive Secretary at least sixty (60) days prior to the opening of the first session of the Annual Meeting, whereupon the nominees' names shall be placed upon the ballot with a notation that they are presented by members independent of the Nominating Committee.

Section 5. **Voting.** Voting at any meeting may be in person or by proxy, but only the Executive Secretary and MEMBERS of the Society shall be eligible to act as proxies. Proxies shall not be valid for more than three (3) months from dates of execution. The Executive Secretary and the MEMBERS acting as proxies shall hold the ballots of their principals secret and confidential. Voting for election of officers, Council members, members of the Committee on Research, on proposals to amend these By-Laws, and on questions required to be referred to the Society persuant to **Article V**, *Section 2,* shall be by secret ballot. In the event of any tie vote, the Council shall decide the vote.

Section 6. **Ballots.** Together with notice of the Annual Meeting, the Executive Secretary shall forward appropriate proxies and ballots to members entitled to vote. The proxies and ballots shall contain spaces for write-in names.

Biographies of 1958 Nominees

Officers

For President — E. R. QUEER, director and professor of engineering research, The Pennsylvania State University, University Park, Pa., is presently serving the Society as first vice president. He was second vice president in 1956 and treasurer for the two previous years. Since 1950 he has served as a member of Council.

Professor Queer was born in Johnstown, Pa., in 1904. A student of electrical engineering at Pennsylvania State College, he received his B.S. in 1926 and M.S. in 1928. He has been associated with the College of Engineering and Architecture in the field of research since graduation, serving on the faculty since 1926, and as director of engineering research since 1952. The author of a number of bulletins and technical papers, he has conducted extensive research, particularly in the fields of heat and moisture transfer, thermodynamics, adsorption by chemical desiccants, and in housing.

E. R. Queer
University Park, Pa.

Professor Queer holds the rank of captain in the U. S. Naval Reserve. During World War II, he served for 5 years in the Air Conditioning Section of the Bureau of Ships, receiving commendations from Adm. C. W. Nimitz and J. A. Forrestal, Secretary of the Navy. He now acts as a consultant to the Chief of Army Ordnance, the Bureau of Yards and Docks of the U. S. Navy, the U. N. Permanent Headquarters on condensation control in the United Nations Buildings, and several architect-engineer firms on long-term storage and preservation of military material, on dehumidification, on thermal insulation, and on protective coatings.

Since he joined the Society in 1933, he has been on various committees, among which were the Technical Advisory Committees on Navy Studies, and on Air Sterilization, 1948; Insulation, 1939-49; and Human Calorimetry, 1949-56. He also served on the following: Committee on Research, 1948-50; Admission and Advancement, 1945-47, and as chairman, 1947-48; Federal Liaison, 1949; Program and Papers, chairman, 1951-52; Ways and Means, 1952 and 1954-55, and chairman, 1953; and Finance Committee, 1952-54, and chairman, 1955. Last year he was chairman of the Regions Central Committee, composed of regional directors, and of the Honors and Awards Committee. Currently he is serving as chairman of the Executive Committee after 3 years as a member. Additionally he is the present chairman of the F. Paul Anderson Committee. For the past 4 years, he has been an ASHAE representative on the ASHAE-*ASRE* Committee on Cooperation, and is now serving on the Executive Committee of the *Engineers Joint Council.*

Registered as a professional engineer in the State of Pennsylvania, Professor Queer is also a member of the *Society of Naval Architects and Marine Engineers,* United States Naval Institute, *American Society of Naval Engineers. ASTM,* Sigma Xi and Theta Xi. He is a member of the Cosmos Club, Washington, D.C., and is listed in *Who's Who in Engineering.*

For First Vice President—ARTHUR J. HESS, president, Hess, Greiner & Polland, Los Angeles, Calif., is now serving as 2nd vice president of the Society. Chairman of the Regions Central Committee this year, he served previously as regional director of Region 4. He has been a member of Council since 1954, was chairman of the Finance Committee last year after 2 years as member, and is now a member of the Executive Committee.

For over 20 years Mr. Hess has been engaged in the application and sale of engineering products. Projects on which he has worked include the stages at the 20th Century-Fox Studio; the heating, ventilating and air conditioning for the Co-op wind tunnel at Pasadena and at Curtiss-Wright; and the Earhart Research Laboratory, California Institute of Technology.

Mr. Hess was born in Pasadena in 1904. He studied civil engineering at the University of California at Los Angeles and at Berkeley, and the University of Southern California. In 1928 he entered business as a plumbing and heating contractor. From 1930 to 1936 he was a consulting engineer, concurrently teaching night courses for the Los Angeles Board of Education.

A member of the Society since 1937, Mr. Hess has been an active leader of the Southern California Chapter. He was elected president of the chapter in 1941, having previously served as treasurer, secretary and vice president.

His service to the Society includes chairmanship of the Chapters Conference Committee, 1952; and membership on the Committee on Promotion of Research, 1949; Chapter Relations Committee, 1950-52 and 1955; and Long-Range Planning Committee, 1953-55. Mr. Hess, who served on the Committee on Research from 1950 to 1953, has held membership on the TAC on Corrosion, 1950; on Air Cleaning, 1951-55; and on Sensations of Comfort, 1949-57. Currently a member of the TAC on Evaporative Cooling, he acted as chairman of that body from 1953-55, and has been chairman of the TAC on Plant and Animal Husbandry since 1953. Chairman of the Program and Papers Committee in 1955, he was chairman of its Advisory Subcommittee last year. This year he is serving as chairman of the Building Committee.

A. J. Hess
Los Angeles, Calif.

A past president of *ASRE*, Mr. Hess was selected as an *ASRE* representative for the ASHAE-*ASRE* Committee on Cooperation, and he is the ASHAE representative on the U. S. National Committee of the *International Institute of Refrigeration.* He is also a member of the *Air Pollution Control Association,* Free and Accepted Order of Masons, Shriners, Kappa Alpha, and Chi Epsilon.

Mr. Hess is the author of several articles, including Air Conditioning in Moving Picture Studios, Evaporative Cooling, Air Conditioning in Film Laboratories, and Plant Research in the Phytotron. He is listed in *Who's Who in Commerce and Industry.*

For Second Vice President — WALTER A. GRANT, vice president, Carrier Corp., Syracuse, N.Y., was born August 27, 1904 in New York, N.Y., and is a graduate of Columbia University. He received his A.B., B.S. and M.E. degrees and has been affiliated with Carrier since 1928.

Journal Section

Mr. Grant joined the company as a student engineer and has served as application engineer, development engineer, Eastern regional chief engineer, director of application engineering, director of research, and vice president, Research and Development Division.

Walter A. Grant
Syracuse, N.Y.

A member of the Society since 1929, Mr. Grant has served on the Committee on Research, 1949-54; TAC on Odors, 1949-53; TAC on Sensations of Comfort, 1949-51; TAC on Air Distribution, 1952-53, and vice chairman, 1954; and the 1952 and 1953 Nominating Committees. During the 3-year term on Council which he is currently completing, Mr. Grant has served as a member of the Finance Committee, 1956, and as its chairman, 1957; as a member of the Long-Range Planning Committee, 1956; the Nuclear Energy Engineering Committee, 1956-57; and Program and Papers Committee, 1955, chairman, 1956; and Advisory Committee chairman, 1957.

Co-author (with W. H. Carrier and R. E. Cherne) of the textbook, *Modern Air Conditioning, Heating and Ventilating*, Mr. Grant also has written numerous technical articles and has contributed material for THE GUIDE and *ASRE* Data Book.

Listed in *Who's Who in Engineering* and in *American Men of Science*, Mr. Grant also holds membership in *ASRE*, *AAAS* (fellow), Tau Beta Pi, Sigma Xi, Phi Gamma Delta and University Club, and is a licensed professional engineer in New York and New Jersey.

For Treasurer — JOHN H. FOX, vice president-sales, Honeywell Controls, Ltd., Toronto, Ont., Canada, served on the Council of the Society from 1951 to 1956. Last year he also was regional director of Regional Area 7.

Born and educated in Toronto, Mr. Fox was graduated from the University of Toronto in 1927 with a B.A.Sc. The following year he was employed by the University as a demonstrator in its hydraulics department. Prior to his association with the Minneapolis-Honeywell Regulator Co., Mr. Fox worked for C. A. Dunham Co., Ltd., for 6 years as assistant to the chief engineer. He joined Minneapolis-Honeywell in 1935 as a sales and application engineer.

During World War II, Mr. Fox, a lieutenant colonel with the Royal Canadian Electrical and Mechanical Engineers in Europe, was decorated with the Order of the British Empire. After the war, in 1946, he rejoined Minneapolis-Honeywell as sales manager of the Commercial Controls Division, and in 1951 became manager of the Central Region. He succeeded to general sales manager 2 years later and was named to his present post last year.

Mr. Fox became a member of the Society in 1935 and was elected president of the Ontario Chapter in 1950. He had been a member of the board of governors, 1938-39 and 1946-48, and was elected to the vice presidency for 1949. He has been active on the following Society committees: Chapter Delegates, 1949; Chapters Conference, 1950 and 1952; Program and Papers Committee, 1951-52; Chapter Relations Committee, 1950, 1955; and Membership Committee, 1954. From 1954 to 1955 he was chairman of the special committee To Codify Council Policies, and was chairman of the Public Relations Committee, 1955-56, of which he is a member this year.

J. H. Fox
Toronto, Ont., Canada

Currently serving as president of the *Association of Professional Engineers of Ontario*, he also holds membership in the *Engineering Institute of Canada*, *Institution of Mechanical Engineers* (London), Engineers Club of Toronto, Royal Canadian Military Institute of Toronto, Toronto Board of Trade, Canadian Club and Empire Club. He is a past master of the University Lodge, A. F. & A. M.

Members of Council
(*three-year term*)

FRANK H. FAUST, manager, product planning, commercial and industrial air-conditioning department, General Electric Co., Bloomfield, N.J., was born in Salt Lake City, Utah. He attended Sheffield Scientific School, Yale University, from which he received his B.S. in 1926. Mr. Faust also took a course in industrial physiology at the Harvard University School of Medicine, and a course in air conditioning at Case Institute of Technology. During his association with General Electric, he took the company's advanced engineering course and courses in heating, air conditioning, sales analysis, and professional business management.

Formerly an assistant instructor at Yale, Mr. Faust joined the General Electric Co. in 1926, and has been successively in the test department, the domestic and the commercial refrigerator engineering departments, engineering general department and air-conditioning department.

Mr. Faust has been a contributor to the Society's HEATING, VENTILATING, AIR CONDITIONING GUIDE, was associate editor, Section VIII of the Applications Volume, *ASRE Data Book*, and was editor-in-chief of the 1951 edition of the *Handbook of Oil Burning*.

F. H. Faust
Bloomfield, N.J.

Since he joined the Society in 1930, Mr. Faust has served on numerous committees. Now in the middle of a second 3-year term on the Committee on Research, he has served as a member of its Executive Committee and is presently on the Long-Range Research Program Committee. He was vice chairman of the TAC on Heat Pump, 1953, and is vice chairman of the TAC on Thermal Circuits. In addition, he recently completed a 3-year term on the Standards Committee, including one year as chairman, was a member of the Chapters Conference Committee, 1953-54, and is now serving on the Publication Committee.

He is chairman of the committee on air conditioning of the *National Fire Protection Association* and is an *ASRE* representative on the Joint Committee on Standards for Comfort Air Conditioning. He was the first chairman of the ASHAE-*ASRE* Joint Committee on Cooperation, and also was vice chairman of the Code Drafting Committee for the B9 Safety Code for Mechanical Refrigeration of the *American Standards Association*.

Active in the organization of the North Jersey Chapter, initiated in 1952, Mr. Faust served as its president in 1952-54 and as a member of its board of governors, 1952-55. Mr. Faust, then a member of the

New York Chapter, was general chairman of the Committee on Arrangements for the 1952 Semi-Annual Meeting in Spring Lake, N.J.

He served 3 three-year terms as member of Council of *ASRE*. He belongs to Tau Beta Pi, *Yale Engineering Association, American Marketing Association* and *American Management Association.*

FRED JANSSEN, standards engineer, gas department, Public Service Company of Colorado, has been connected with that company since 1928. In the earlier years, previous to his design and supervisory work, his duties were drafting and meter testing. Since 1938 he has been in responsible charge of heating, ventilating and air conditioning, and in the last several years has engaged in some structural engineering.

Mr. Janssen, who was born in Dallas, Tex., studied electrical engineering at the University of Texas. He joined the Public Service Company after completing his education.

Upon joining the Society in 1945, Mr. Janssen became an active member of the Rocky Mountain Chapter. He was elected secretary for 1945-46; president, 1948-49; a member of the board of governors, 1945-51; and has served as chairman of that chapter's code committee for the past 7 years. Also, from 1950 to 1954 he was chapter representative to the *Colorado Engineering Council.*

Serving on Society committees as well, he was Rocky Mountain Chapter delegate to the Chapter Delegates Committee, 1949; alternate, Chapters Conference Committee, 1950, and member, for a few years following. He served as a member of the Nominating Committee in 1950, 1953 and 1954. Currently he is 1st alternate to the Nominating Committee and a member of the Program Subcommittee.

Fred Janssen
Denver, Colo.

Since 1950, Mr. Janssen has been chairman of the City and County of Denver Warm Air Heating and Gas Fitting Code Advisory Committee, and member of its Plumbing Code Advisory Committee. He is also consultant for the State Plumbing Code Committee.

In addition to holding membership in the Society, Mr. Janssen is a member of the *Colorado Engineering Council*, Rotary Club, Chamber of Commerce and its Legislative Committee. For the past 3 years he has been chairman of the Inter-County Regional Planning Commission. He has served on the City Council, City of Englewood, and on various civic committees. Mr. Janssen, a registered professional engineer in the state of Colorado, is now a member of the Board of Examiners for Refrigeration, Warm-Air Heating and Air-Conditioning Contractors, City of Denver. He is listed in *Who's Who in the West.*

JAMES W. MAY, director of technical training, American Air Filter Co., Louisville, Ky., has been a member of the Society since 1935.

J. W. May
Louisville, Ky.

For the past 2 years Mr. May has been serving on the Publication Committee of the Society, and he is presently representing ASHAE on the committee on abstracting services of the *Engineers Joint Council.* He was a member of the Chapters Conference Committee in 1954 and of the TAC on Air Cleaning for a number of years.

When the Bluegrass Chapter was formed in 1954, Mr. May was selected as its first president. He was a member of the board of governors for 1955 and is the current program chairman of the chapter.

Mr. May was born in Anaconda, Mont. He attended the University of Kentucky, receiving his B.S. in 1929 and M.E. in 1930. He started his career as research assistant and instructor in the College of Engineering at the University of Kentucky. In 1935 he was named assistant professor of heating and ventilating, advancing later to associate professor.

Attention!!
Members of ASHAE
Moved or Moving?

Each month mail is returned BECAUSE you overlooked advising us of the change in your address.

The return mail is a loss to you, and an added expense to the Society.

In your own interest, will you please advise us at once of any change in your business or home address, indicating which is your mailing address.

ASHAE Headquarters
62 Worth St.
New York 13, N. Y.

During the summer months Mr. May worked for various companies, returning to the university in the fall. After 4 summers spent with the American Air Filter Co., he was named director of research of that company in early 1943. Five years later he became technical director.

Mr. May is the author of a paper on The Cleaning of Air Pollutants, published in the JOURNAL. He has written a number of papers published in American and foreign technical magazines, on such subjects as air filtration, the ink mist problem, and electrostatic precipitators.

He is also a member of *ASME*, the *Kentucky Society of Professional Engineers*, Tau Beta Pi, Sigma Xi, and the State of Kentucky Advisory Comm. on Nuclear Energy. He is listed in *American Men of Science.*

GAYLE B. PRIESTER, air-conditioning engineer, Baltimore Gas and Electric Co., Baltimore, Md., has the distinction of having served as president of 2 Society chapters: Northern Ohio Chapter, 1945-46, and Baltimore Chapter, 1950-51.

G. B. Priester
Baltimore, Md.

His service to the Society includes membership on the Chapters Conference Committee and ASHAE-*IES* Joint Committee. He was a member of the TAC on Air Distribution, 1944-50, and chairman, 1951-53; and a member of the Publication Committee, 1954-55, and chairman, 1956.

Mr. Priester was born in Minneapolis, Minn. He was graduated from the University of Minnesota with a B.M.E. in 1933, and received an M.S. from Harvard University and M.E. from Case Institute of Technology.

For 6 years beginning in 1935, Mr. Priester was connected with Carrier Corporation as an application and sales engineer. He then transferred to teaching at Case Institute of Technology, successively as instructor, assistant professor and associate professor. In 1946 he became associated with the Baltimore Gas and Electric Co. Along with his other duties he has maintained practice as a consultant since 1941.

He is co-author of a reference book, *Refrigeration and Air Conditioning*, and of ASHAE technical papers. The *ASRE Data Book*, 1953-54, was published under his supervision as editor-in-chief.

In addition to being a member of the Society, Mr. Priester is a fellow and national director of *ASRE*, and a member of the Engineers Club of Baltimore, Tau Beta Pi, Pi Tau Sigma and Sigma Nu. He is a registered professional engineer.

Committee on Research
(three-year term)

Paul R. Achenbach, chief, air conditioning, heating, and refrigeration section, National Bureau of Standards, assumed his present position in March of this year. To this appointment he brought with him a background of 20 years experience with the Bureau, plus a year of association with the *Naval Medical Research Institute* as general engineer in the Bioenergetics Division.

Mr. Achenbach was born in Thelma, Alta., Canada, and attended school in Wyoming. He received a B.S. in electrical engineering from the University of Wyoming in 1931 and a B.S. in mechanical engineering the year following.

His association with the Bureau of Standards began in 1937. He was engaged as a mechanical engineer, conducting research on heating systems, chimney performance and refrigerating units. Concurrent with his work at the Bureau, he spent several years as a part-time instructor in heating, air conditioning and refrigeration at the University of Maryland. In 1947 he was named assistant chief, heating and air-conditioning section, of the Bureau, and, except for his recent interval at the *Naval Medical Research Institute*, has spent the rest of his career participating in the direction of the research program at the Bureau of Standards.

Since joining the Society in 1942, Mr. Achenbach has been an active participant in ASHAE affairs. He was president of the Washington, D.C., Chapter in 1949, having previously served as treasurer and vice president. His service to technical advisory committees of the Society is as follows: member of TAC on Combustion, 1947-56; Sorption, 1953; Heating and Air-Conditioning Loads, and Physiological Research, 1956-57; vice chairman, Weather Data, 1954-57; and chairman, Heating Load, 1953-55. He was secretary, Chapter Delegates Committee, 1950; Nominating Committee member, 1951; and Guide Committee member, 1952-55.

A number of technical papers have been written with Mr. Achenbach either as sole author or as collaborator. These have appeared in the Transactions of the Society and in various publications. One of his most recent titles, Design and Performance of a Portable Infiltration Meter, is in the July 1957 Journal Section. Mr. Achenbach has also worked on revisions for The Guide, and was associate editor of the *ASRE Refrigerating Data Book*, 1952, 1954, and 1956.

Presently chairman of the Baltimore-Washington Section of *ASRE*, he is also a member of the D.C. Refrigeration and Air-Conditioning Code Committee, the *ASA* subcommittee on fireplaces and chimneys, and committee on refrigeration nomenclature, and the U. S. national committee, *International Institute of Refrigeration* 1957. He holds membership in Sigma Tau and Phi Kappa Phi.

Last year Mr. Achenbach received the Department of Commerce Silver Medal for Meritorious Service. He is listed in *American Men of Science*.

P. R. Achenbach
Washington, D.C.

Stanley F. Gilman, associate director of research, Research and Development Division, Carrier Corporation, Syracuse, N.Y., has served for several years on technical advisory committees of the Society. He has been chairman of the TAC on Thermal Circuits since 1955 and a member of the TAC on Air Distribution for the past 6 years. In addition, he has worked as chairman or member of various subcommittees of the TAC on Air Distribution.

Mr. Gilman, born in Portland, Me., was graduated from the University of Maine in 1943 with a B.S. in mechanical engineering. Following service in the Bureau of Ordnance, U. S. Navy, and a year of association with the Gilman Furnace Co., Portland, Mr. Gilman became affiliated with the mechanical engineering department of the University of Illinois in 1947. He began as an instructor and later advanced to research assistant professor. While at the University, he gained his M.S., 1948, and Ph.D., 1953. He has been with Carrier Corporation for the past 4 years.

An ample writer, Mr. Gilman is the author or co-author of a great many technical papers on duct systems, year-round air conditioning, heat pumps, and related subjects, published in ASHAE Transactions, the Journal Section, and various other magazines, bulletins and proceedings. Among his most recent titles are Thermal Circuit Analysis for Developing Application Engineering Information, Branch Fitting Performance at High Velocity, and Distribution of Air within a Room for Year-Round Air Conditioning.

After he joined the Society in 1948, Mr. Gilman became affiliated with the Central New York Chapter. He served the chapter as a member of the board of governors, 1955-56; treasurer, 1956-57; and is currently secretary.

At the present time, he is also a member of the technical data committee of *NWAH & ACA*, of Tau Beta Pi, Sigma Xi and Pi Tau Sigma. He is a licensed professional engineer in New York and is listed in *American Men of Science*.

S. F. Gilman
Syracuse, N.Y.

Neil B. Hutcheon, assistant director, Division of Building Research, National Research Council, Ottawa, Ont., Canada, was born in Rosetown, Saskatchewan Canada. He is a 1933 graduate of the University of Saskatchewan, where he received a B.E. in engineering, and 2 years later an M.S. in engineering. Dr. Hutcheon then attended the University of London for 2 years, where he received a Ph.D. in engineering.

In 1937 he returned to the University of Saskatchewan as assistant professor to teach machine design, heating and ventilation, and 5 years later became professor of mechanical engineering. Since 1945 Dr.

N. B. Hutcheon
Ottawa, Ont., Canada

Hutcheon has devoted his time and efforts to teaching, research in heat and moisture flow in walls, and as a consultant in the design of a number of heating and ventilating systems. In addition, during 1949-50, he was a technical consultant to the Prairie Regional Station of the Division of Building Research, National Research Council, which was located on the University campus. During 1951, Dr. Hutcheon took a year's leave of absence from the University to spend time in Ottawa as a member of the Division of Building Research staff, which eventually led to his present position as assistant director.

A member of the Ottawa Valley Chapter of the Society, Dr. Hutcheon has been active on the following ASHAE committees: Committee on Research, 1952-57, and member, Executive Committee of Committee on Research, 1955; TAC on Insulation, 1951, and vice chairman, 1952-57; TAC on Heat Flow through Glass, vice chairman, 1952-55; TAC on Heating Load, 1954-55; TAC on Solar Energy Utilization, 1956-57; and Guide Committee, 1955-57.

Among the technical articles written by Dr. Hutcheon are 3 published by the Society, of which he was co-author: Moisture Migration in a Closed Guarded Hot Plate, Thermal Performance of Frame Walls, and Dependence of Water Vapor Permeability on Temperature and Humidity.

Dr. Hutcheon is a registered professional engineer in Saskatchewan. In addition to his active Society membership, he holds membership in the *Engineering Institute of Canada*.

Richard M. Stern, partner, Stern & Towne, Seattle, Wash., has been in professional practice since 1947. Most of his projects have been for architectural firms in Washington and Alaska.

Mr. Stern was born in Valley City, N.D., and received his B.S. in civil engineering from the University of North Dakota in 1935. After a brief period with Carrier Corporation as a junior engineer, he worked in engineering, sales and installation for air-conditioning and refrigeration contractors in Minneapolis, Minn., and Spokane, Wash. In 1942 he joined The Austin Co., Seattle, and in 1945 became associated with McClelland & Jones and Assoc. After several years with his own practice as a consulting engineer, Mr. Stern entered into his present partnership.

Engaged in the development of perimeter heat for residential and larger applications in the Northwest, he has worked on a grid system of warm air radiant-convection heating. He addressed the Oregon Air-Conditioning Conference on the subject in 1952. Mr. Stern has also lectured on heating and ventilating at the School of Architecture, University of Washington.

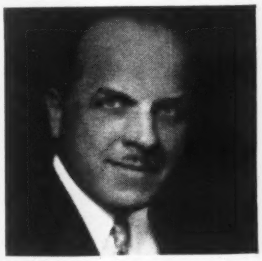
After joining the Society in 1946, Mr. Stern assumed an active role in the Puget Sound (then Pacific Northwest) Chapter. He was elected vice president of the Chapter for 1950, was president in 1951, and a member of the board of governors, 1952. While president of the Chapter, he was a member of the Society's Chapters Conference Committee. He is a member of the Nominating Committee for 1957.

Presently serving on the City of Seattle Ventilating Code Committee, he is also a member of *ASRE*, the *Washington Society of Professional Engineers*, and Engineers Club of Seattle. He is co-author of an article on Air Entrainment by Forced Hot Water Flow in Pipes, which appeared in *Heating and Ventilating*.

R. M. Stern
Seattle, Wash.

Herbert E. Ziel has had 37 years of professional experience with Albert Kahn Associated Architects and Engineers, Inc., in the design of hot blast heating, air-conditioning and ventilating systems in industrial, commercial and educational buildings.

He joined the Society in 1924 and has served on the following ASHAE technical advisory committees: Air Conditioning in Industry, 1942-46; Industrial Ventilation, 1947-51; and Industrial Environment, 1952-57. For the past 2 years he has been a member of the TAC on Plant and Animal Husbandry. He is affiliated with the Michigan Chapter.



H. E. Ziel
Detroit, Mich.

Mr. Ziel was born in Detroit, Mich., and received his B.S. in mechanical engineering from Michigan State University.

Technical articles he has written have been presented at Society and chapter meetings. Topics he has covered are The Economic Factory in Converting Recirculated Air for Ventilation, and Industrial Air Conditioning—Design and Installation.

Along with membership in ASHAE, Mr. Ziel holds membership in the *Engineering Society of Detroit* and the *National Society of Professional Engineers*.

Journal Section

BYRD HEADS LAU

Word has been received that T. I. Byrd, Society member of long standing, has been elected president of The Lau Blower Co., Dayton, Ohio. Mr. Byrd assumed his new position on August 1.

Since joining the Lau organization in 1943, Mr. Byrd has served as sales manager, as sales vice president and as executive vice president.

He has been very active in the field of warm air heating and air conditioning, being vice president of *National Warm Air Heating and Air Conditioning Association* as well as a past president of *Air Conditioning Blower Manufacturers Association*, active in the *Oil Heat Institute*, and with other trade groups.

GROWTH OF AIR-CONDITIONED AUTOMOBILES

Figures compiled and released by *Air Conditioning and Refrigerating Institute* indicate the rapid growth and acceptance of air-conditioned automobiles. The Institute reports that shipments of compressor bodies designed for automobile air-conditioning purposes were made in the early part of 1957 at a rate nearly double that of the corresponding period of 1956. During the first third of the year, the reported figure is in excess of 210,000 compressor bodies shipped for automotive uses.

CLEANER AIR PROCEEDINGS AVAILABLE

During October 1956 a symposium was held at *Franklin Institute* at Philadelphia on the general subject of cleaner air for urban areas. Included among the speakers were Leonard Greenburg, M.D., and W. C. L. Hemeon, members of the Society.

A printed booklet of 69 pages has been prepared by *Franklin Institute* which contains transcripts of talks and discussions at the symposium. Copies are available for $3.00 each from the Institute.

INFILTRATION SUBCOMMITTEE MEETS

Under the chairmanship of A. G. Wilson, head, Division of Building Research, National Research Council, Ottawa, Ont., Canada, a group met at the ASHAE Research Laboratory at Cleveland in July, officially the Subcommittee on Infiltration of the TAC on Heating and Air-Conditioning Loads. The meeting furnished a means of considering several subjects having to do with the program of the subcommittee.

Among the subjects was a report to the group by T. C. Min, of the Laboratory staff, on the entrance infiltration project which has been in progress at the Laboratory for some time. As a result it is expected that a publishable report will be available shortly covering the work already accomplished.

The group also decided to recommend that additional studies should be made on the variation of inside-outside pressure differentials at various heights in tall buildings under winter heating conditions.

The Laboratory was asked to prepare a proposal on the study of infiltration through revolving doors, and also to investigate types of windows in common use in order that the subcommittee might have needed information available.

FHA CHANGES ATTITUDE ON HOME AIR CONDITIONING

At a Round Table held in New York on July 30, under the joint sponsorship of *House and Home* and *ARI*, it was announced that FHA plans to instruct its officers to stop penalizing air conditioning in their appraisals and income requirements. This change in FHA attitudes is expected to make a significant difference in the sales prospects of home air conditioning. In fact, one of the purposes of the Round Table was to explore ways in which air conditioning can be made into the principal selling feature of 1958 houses.

It was also announced that FHA will put room coolers on the list of easily removable items that can be included in its evaluations.

The Round Table was attended by 62 people, representing many interested groups in connection with home air conditioning. Among Society members in attendance and active were: W. A. Burbine, Chicago, Ill.; William Bynum, Syracuse, N.Y.; R. A. Gonzalez, Dayton, Ohio; L. N. Hunter, Johnstown, Pa.; R. E. Moore, Morton Grove, Ill.; F. J. Nunlist, Milwaukee, Wis.; T. S. Rogers, Toledo, Ohio; and K. L. Wilson, Minneapolis, Minn.

ACTIVITIES OF SOCIETY CHAPTERS

The 68th chapter, at Johnstown, Pa., received its charter. A variety of Technical Talks and Non-technical Programs were presented by the chapters across the country. New Faces of chapter leaders and Names of prominent members were in the News. Cincinnati Chapter's 25th Anniversary was duly celebrated.

Charter for Johnstown Chapter

A charter meeting for the new chapter at Johnstown, Pa., was held at the Fort Stanwix Hotel on the evening of September 20. With the presentation of its charter, the Johnstown Chapter becomes the 68th chapter of the Society.

With John Everetts, Jr., Philadelphia, Pa., presiding as regional director, the principal speaker following the charter presentation dinner was Pres. P. B. Gordon, New York, N.Y. Mr. Gordon had chosen as his subject *A Contractor Looks at the Air Conditioning of Existing Buildings.*

Following the long-standing custom of the Society, the most recently formed chapter at Jacksonville, Fla., provided the gavel for the new chapter.

Technical Talks

At a meeting of the AUSTIN Chapter, the members heard John Babcock, L.C.R.A. development supervisor, Austin, Tex., explain how the L.C.R.A. opened and closed its dams to minimize damage in the recent flood period. • • • A member of the CINCINNATI Chapter, P. H. Ziel, partner, P. H. Ziel-J. S. Blossom & Assocs., Cincinnati, Ohio, spoke on *High Temperature Hot Water* before an audience of chapter members and guests. • • • Pres. B. J. Saymon, JACKSONVILLE Chapter, introduced 2 speakers, each of whom covered a phase of the use of water in air conditioning. J. B. Miller, chief of the water supply and treatment section, Florida State Board of Health, discussed *Water Supply for Air Conditioning.* Mr. Miller treated the demand for water, sources of water, and water conservation. The second speaker, George Govignon, district engineer, Dearborn Chemical Co., Chicago, talked about *The Chemical Treatment in Air-Conditioning Systems.* Mr. Govignon mentioned the types of water systems and the difficulties encountered in each, as well as the use of chemicals to correct corrosion, scale and slime. • • • The subject selected by a NEW MEXICO Chapter speaker, Norman Hall, Ready-Power Co., Detroit, Mich., was low pressure gas engine-driven refrigeration compressors. At a previous meeting of the Chapter, Wright Langham spoke on *World-wide Fallout*; the information concerning radioactive fallout was expertly prepared and clearly presented. • • • An intriguing program on *Methods of Flame Detection*, including display of actual equipment in operation, was given by Peyton Simpson. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., at a meeting of the NORTH TEXAS Chapter. • • • The preliminary talk at a SACRAMENTO VALLEY Chapter meeting was presented by L. A. O'Meara, mechanical engineer, Sacramento, Calif., on *The Problems of the Small Air-Conditioning Contractor.* The main speaker, E. W. Wilson, outlined *The Problem of Noise in an Air-Conditioning System.* His talk was highlighted with demonstrations of noise and its attenuation. • • • The guest speaker at a SOUTH TEXAS Chapter meeting, R. L. Boyd, Jr., development engineer, Electromode Division, Commercial Controls Corp., Rochester, N.Y., explained *What Electric Heating Is Teaching Us about Heating.* Mr. Boyd's talk was well received and was followed by a lively question and answer period. • • • An interesting discussion on the question *Is Air and System Balancing Necessary* was offered for the benefit of the members and guests of the SOUTHWEST TEXAS Chapter. The speaker, W. L. Lipski, president, Engineered Air Balance Co., Dallas, Tex., pointed out that many problems arise in balancing from the term *or equal* in the specification. He listed the steps which he felt should be included in each phase of any balancing job. • • • WESTERN MASSACHUSETTS Chapter scheduled an address by Peter Vosberg, Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., on *Dual-Duct High Velocity Air Bleeder Systems.* Using slides, he explained the operation of such a system, together with the application and installation problems.

Non-technical Programs

Members and guests of the INDIANA Chapter heard R. A. Rotz describe an automobile test run on the Alaskan Highway. • • • Pres. R. H. Bolding, MEMPHIS Chapter, opened the floor to a discussion of membership and attendance. A number of constructive suggestions on these problems were offered by the members. • • • WESTERN NEW YORK Chapter members enjoyed an afternoon of golf and dinner at the Cherry Hill Country Club, Ontario, Canada.

New Faces

Pres. A. C. Lagow, *AUSTIN* Chapter, appointed the following committee chairmen for the coming year: *Membership*—W. H. Luedecke; *Program*—J. L. Rea; *Attendance and Reception*—L. B. Ward, Jr.; *Special Events*—B. J. Barnhart; *Legislative*—I. W. Wilke; *Publicity*—W. C. Milstead; *Finance*—W. S. Winn; *University of Texas Liaison*—T. M. Stephens; and *Giesecke Fund*—I. W. Wilke. • • • The tellers of election of the *CINCINNATI* Chapter reported the results of their tally: *President*—T. D. Reiley; *Vice President*—C. P. Krantz; *Secretary*—E. A. Sobolewski; *Treasurer*—W. H. Rieger; and *Board of Governors*—A. J. Staubitz. • • • A unanimous ballot was cast for the new slate of INDIANA Chapter officers: *President*—G. W. Vogel; *Vice President*—W. F. Currise; *Secretary*—J. M. Teskoski; *Treasurer*—A. B. Keller; *Board of Governors*—W. L.

Toledo Chapter Officers

Officers and board of governors for 1957-58 term. *(l. to r.)* Front: G. R. Munger, secretary; Robert Greenwald, president; D. L. Wilson, vice president; and J. E. Wilkie, treasurer. Rear: Members of Board of Governors: J. P. Eyster, E. J. Katafiasz, J. F. Guest (immediate past president), and M. D. Williams

Kercheval, R. I. Drum and A. O. Roche, Jr. • • • Pres. J. K. James, NEW MEXICO Chapter, announced the appointment of committee chairmen: *Membership*—L. P. Page, Los Alamos chairman, and W. M. Carroll, Albuquerque chairman; *Attendance*—J. A. Holland, Albuquerque chairman, and Lester Doremire, Los Alamos chairman; *Program*—R. D. Adair, Jr.; *Publicity*—J. P. Wahlen, Los Alamos chairman, and C. G. Davis, Albuquerque chairman; *Finance*—C. T. Sundquist, Los Alamos chairman, and W. L. Jones, Albuquerque chairman; *Technical*—V. J. Stephens; *House and Special Events*—H. K. Pride; *Solar Heating*—D. D. Paxton; and *Code*—Marcello Giomi. Due to the resignation of G. F. Ard, who is moving to the Hawaiian Islands, the board of governors elected R. P. Lee to serve the unexpired term as secretary of the Chapter. • • • SOUTH CAROLINA Chapter officers for the coming year were elected by ballot as follows: *President*—B. A. Leppard; *Vice President*—A. L. Blackstone, Jr.; *Secretary*—H. J. Haar, Jr.; *Treasurer*—A. M. Suggs; *Board of Governors*—F. A. Bailey, III, and W. O. Blackstone. • • • The WESTERN MASSACHUSETTS slate for 1957-58 will be: *President*—F. A. Ferraro; *Vice President*—C. R. Munn; *Secretary*—J. J. Curran; *Treasurer*—R. W. Maki; *Board of Governors*—J. E. Reed, R. E. Cross, A. M. Lovenberg, J. F. Hayes and B. R. Washburn.

Names in the News

A charter member of the St. Louis Chapter, Edwin Jones, received his Life Membership certificate from H. E. Sproull, at a CINCINNATI Chapter meeting. T. D. Reiley, incoming president of the Cincinnati Chapter, presented the immediate past president, R. G. Anderson, with the past president's pin. Mr. Anderson was given a rising ovation as a vote of thanks for his services during his presidency and in previous years. In addition, Mr. Anderson received a package of clothespins in recognition of his championship as Cincinnati Chapter father with the most children. • • • F. B. Morse, faculty advisor for Purdue University Student Branch, reported on the Student Branch at a meeting of INDIANA Chapter. G. T. Dollas, president of the Student Branch, thanked the Indiana Chapter for the excellent support received during the year past. W. F. Currise presented the William T. Miller Award to G. T. Vail, Jr., J. T. Evans, and R. F. Jackson. A donation to the Chapter of a set of TRANSACTIONS, 1907-50, was made by G. J. Hayes in honor of his father, Joseph G. Hayes. • • • Past president's pins were presented to R. E. Cross and J. E. Reed, WESTERN MASSACHUSETTS Chapter.

Journal Section

25th Anniversary for Cincinnati Chapter

CINCINNATI Chapter celebrated its 25th anniversary at the Alms Hotel. The program was arranged in conjunction with the Annual Past Presidentts Dinner. Pres. R. G. Anderson opened the meeting with a welcome address. T. D. Reiley conducted the introduction of past presidents and the anniversary program. A short synopsis of the origination of the chapter was given by I. B. Helburn.

SOUTHERN CALIFORNIA CHAPTER ADVISES ON LOS ANGELES CODES

A revision of the heating code and the refrigeration code of the city of Los Angeles is in process. Industry code advisory committees are being formed for some 9 topical subjects in connection with the heating code and for 6 similar topics in connection with the refrigeration code.

The chapter has established two new task subcommittees to centralize chapter activities in its Industry Code Advisory Committee. The chapter plans to have one or more persons active in each of the groups in which it is interested in connection with the revision of the 2 codes.

BERGTHOLDT ELECTED WEBSTER VICE PRESIDENT

George C. Bergtholdt, a member of the Society, who for some years has been chief engineer at Webster Engineering Co., Tulsa, Okla., has recently been elected vice president of that firm. In addition to membership in the Society, Mr. Bergtholdt is also a member of *ASME* and the *Instrument Society of America.* He is also a member and active in committee work in the *American Gas Association.*

CANDIDATES FOR MEMBERSHIP

Listed here are the names of 81 men who are candidates for membership or advancement in membership grade. Members are requested to assume their full share of responsibility of receiving these candidates into membership by advising the Executive Secretary before October 31, 1957, of any whose eligibility for membership is questioned. Unless such objection is made these candidates will be voted on by Council.

Note: **Advancement* †*Reinstatement*

Arkansas (*Region* 6)

SHOLLMIER, M. O., Mech. Engr., Ginocchio-Cromwell & Assoc., Little Rock.

California (*Region* 4)

MCLAIN, BENJAMIN†, Chief Engr., George Vernon Russell, Sunnyvale.

RING, R. C., Cons. Engr., Upland.

District of Columbia (*Region* 5)

HOPPE, M. F.†, Cons. Engr., Washington.

Florida (*Region* 5)

HARWARD, W. G., Br. Mgr., American Blower Division, American-Standard, Miami.

MILLER, D. B., Mech. Engr., Beiswenger Hoch & Assoc., Inc., Jacksonville.

Journal Section

Ramien, C. H., Br. Mgr., Owens-Corning Fiberglas Corp., Jacksonville.

Georgia (*Region* 5)

Gupton, G. W., Cons. Engr., Newcomb & Boyd, Atlanta.

Illinois (*Region* 2)

Cavallini, A. F., Partner, Paul J. Gawrusik & Assocs., Chicago.

Griggs, W. C., Sales Engr., Johnson & Heckel, Chicago.

Helikson, F. W., Pres., F. W. Helikson, Inc., Chicago.

Parker, R. E., Vice Pres. in Charge Research, Ilg Electric Ventilating Co., Chicago.

Ringness, W. H., Staff Engr., Caterpillar Tractor Co., Peoria.

Indiana (*Region* 2)

Earley, A. F., Sales Engr., G. W. Berkheimer Co., Gary.

Iowa (*Region* 3)

Kirby, Merle, Engr. in Training, Stanley Engineering Co., Muscatine.

Kansas (*Region* 3)

Eason, J. M. Jr., Designer, Robert R. Bayles & Assocs., Mission.

Louisiana (*Region* 5)

Bridges, H. L., Planning & Bldg. Engr., Southern Bell Telephone & Telegraph Co., New Orleans.

Maryland (*Region* 5)

Hickey, J. J., Mech. Engr., Henry Adams, Inc., Baltimore.

Trostle, J. F., Owner, Trostle's Heating & Ventilating, Cumberland.

Michigan (*Region* 2)

Fiocca, M. T., Engr., American Blower Division, American-Standard, Detroit.

Missouri (*Region* 3)

Coad, W. J., Engr.-Secy., D. C. Air Conditioning Co., St. Louis.

Hellmer, G. F., Partner, Hellmer & Medved, Kansas City.

Young, F. A., Sales Engr., Chas. D. Jones Co., Kansas City.

New Jersey (*Region* 1)

Wilkening, G. M., Indus. Hygiene Engr., Esso Standard Oil Co., Linden.

New York (*Region* 1)

Brignoli, F. J., Jr., Proj. Engr., Bernard Zwerling Co., Inc., Manhasset.

Carll, Gilbert, Owner, Pierre S. Olsen Co., Huntington.

Chaplin, A. A., Pres., Queens Metal Fabricators, Inc., Manhasset.

Cleland, W. T., Assoc., Seelye Stevenson Value & Knecht, New York.

Davis, W. S., Tech. Asst., International Business Machines, Endicott.

Deer, Edward, Proj. Mgr., Kerby Saunders, Inc., New York.

Frey, J. S., Sales Engr., Roxen Service, Inc., Oceanside.

Fuller, Arthur, Engr., Republic Air Conditioning Corp., Hempstead.

Gayle, S. L., Sales Engr., Associated Thermal Products, New York.

Gilroy, W. L., Service Mgr.-Proj. Engr., Hilrich Co., Hempstead.

Henry, K. F., Sales Engr., Minneapolis-Honeywell Regulator Co., Long Island City.

Hoops, W. H., Supvsr., Sperry Gyroscope Co., Great Neck.

Irving, R. J., Field Engr., John J. Nesbitt, Inc., New York.

King, Sol, Engr., United Combustion Co., Inc., Huntington Station.

Maxwell, M. W., Jr., Sales Engr., Gale Engineering Co., New York.

Miller, C. W., Pres., The Air Supply Corp., Hempstead.

Moran, D. F., Sr. Supvsr.-Sales Engr., American Air Filter Co., New York.

Morgenstern, M. A., Mech. Engr., Guy B. Panero Engineers, New York.

Nestle, J. D.†, Engr., Island Air Conditioning, Inc., Huntington Station.

Nexsen, S. W. H., Prop., Nexsen Conditioning Co., Hempstead.

Quick, H. A., Sales Repr., H. B. Smith Co., Inc., New York.

Riehl, R. D., Sales Engr., John J. Nesbitt, Inc., New York.

Rive, L. H., A-C. Spec., Long Island Lighting Co., Mineola.

Silberstein, B. H.†, Engr., Henry J. Campbell, Jr., Mineola.

Tadlock, C. V., Archt. Designer, Sperry Gyroscope Co., Great Neck.

Tisdale, R. F., Sales Engr., Johnson Service Co., New York.

Vittiglio, J. B., Pres., John Grace & Co., Inc., Mineola.

Walzer, S. M., Pres., Republic Air Conditioning Corp., Hempstead.

Zyniecki, E. C., Jr., Br. Mgr., J. W. Stevens Co., Albany.

North Carolina (*Region* 5)

French, T. C., Service Sales & Technician, Johnson Service Co., Greensboro.

Ohio (*Region* 2)

Palowitch, J. W., Field Engr., Fairbanks, Morse & Co., Cleveland.

Pennsylvania (*Region* 1)

Austin, P. H., Asst. Treas., National-U.S. Radiator Corp., Johnstown.

Brown, B. C.*, Mgr., A.-C. Engr., National-U. S. Radiator Corp., Johnstown.

Frambach, R. L., Archt., Hunter, Campbell & Rea, Johnstown.

Greyson, J. C., Prof. Mech. Engrg., Villanova University, Ardmore.

Harvey, H. N., Br. Mgr., Amstan Supply Div., American Radiator & Standard Sanitary Corp., Johnstown.

Mac Alarney, G. C., Pres. & Treas., Soisson Electric Co., Inc., Cresson.

Morrison, J. L., Dir. of Training, National-U.S. Radiator Corp., Johnstown.

Petz, R. F., Owner, Griffith & Petz, Johnstown.

Price, Norman J., Dvlpt. Engr., National-U.S. Radiator Corp., Johnstown.

Weiss, A. J.†, Sales engineer, Lehigh Air Conditioning Corp., Allentown.

Youngblood, C. E., Asst. Supt., Rod & Wire Div., Bethlehem Steel Co., Johnstown.

Tennessee (*Region* 5)

Akin, P. M., Sr., Pres., Akin-Saylor Co., Inc., Knoxville.

Texas (*Region* 6)

Freund, R. G., Student, University of Texas, Austin.

Rankin, J. A., Jr., Mech. Designer, Zumwalt & Vinther, Dallas.

Stephens, R. L., Jr., Mgr. A.-C., S. W. Div., Lennox Industries, Ft. Worth.

Stoddard, H. O., Sales Engr., American Blower Division, American-Standard, Dallas.

Weimer, E. D., III, Mech. Design Engr., Convair Fort Worth, Division Gen. Dynamics, Fort Worth.

Zilbermann, A. H.†, Vice Pres., Carrier Bock Co., Dallas.

Utah (*Region* 4)

Rees, R. D., Sales Engr., American Gilsonite Co., Salt Lake City.

Virginia (*Region* 5)

Hansen, Edgar, Jr., Sales Engr., American Blower Division, American-Standard, Richmond.

West Virginia (*Region* 5)

Oughton, W. J., Draftsman, Harry Ray Nay, Wheeling.

Canada (*Region* 7)

Heathcote, E. T. B., Sales Mgr., Therm-O-Rite Products, Ltd., Toronto, Ont.

Juteau, Gabriel, Repr., Sheldons Engineering, Ltd., Montreal, Que.

Richardson, F. W., Mgr., Tobin-Everedy, Ltd., Ottawa, Ont.

Zeglinski, Chester, Sales Engr., B. F. Sturtevant Co. of Canada, Ltd., Toronto, Ont.

Holland

Bakker, G. A., Managing Dir., N. V. Ned. Airconditioning Mij. Gebr. van Swaay, The Hague.

OBITUARIES

HERBERT J. CHURCH
Toronto, Ont., Canada

Herbert J. Church, 73, a life member of the Society and a past president of the Ontario Chapter, died at the Humber Memorial Hospital on August 20. He had been serving as a consultant for Darling Bros., Ltd., Toronto, after 35 years as manager.

Mr. Church, born in Bristol, England, moved to Canada in 1907 and became associated with the Grand Trunk Railway, Montreal, and Fairbanks-Morse Company, Toronto. He entered the sales department of Darling Bros., Ltd. in 1911.

A member of the Society since 1922, he was elected president of the Ontario Chapter. In 1930 he also served as vice president and member of the Board of Governors of the Chapter as well as a member of the Society's Nominating Committee, 1931.

He was a member of the *Association of Professional Engineers* and the Engineers Club of Toronto. He had also been associated with the *Institute of Mechanical Engineers*, England. One of the organizers of the Weston Golf and Country Club, he served as its first president in 1916.

He leaves his wife, Mabel; three daughters, Mrs. K. W. Foster, Mrs. R. Taylor, and Phyliss; and a son, John.

THOMAS M. CUNNINGHAM
Chicago, Ill.

Thomas M. Cunningham, executive secretary, *Heating, Piping & Air Conditioning Contractors' Chicago Association*, died on August 11 at the age of 58. He was a member of the Society for twenty-seven years.

Mr. Cunningham, who was born in Clydebank, Scotland, had a long career with Carrier Corporation beginning with his arrival in the United States in 1923. Starting as a construction superintendent in Newark, N. J., he advanced steadily and was promoted to vice president and general manager of the Dallas, Tex., branch office in 1931. He later moved to Syracuse, where he served as production manager for Carrier Corporation, national contract and service manager, and finally as director of industrial relations. He was named executive secretary of the *Mechanical Contractors' Chicago Association*, which until recently was known as the *Heating, Piping & Air Conditioning Contractors' Chicago Association*, in 1950.

From 1945 to 1946 Mr. Cunningham served as a member of the Industrial Commission of the National War Labor Board. He was a member of *ASRE*, the Order of Scottish Clans and the Masons.

Mr. Cunningham is survived by his wife, Marjorie.

ERIC F. HYDE
Detroit, Mich.

Eric F. Hyde, 70, a past president of the Michigan Chapter and president of Hyde & Bobbio, Inc., Detroit, Mich., died suddenly on August 22. Mr. Hyde, a widely respected Detroit engineer, had been a member of the Society for twenty years.

He was born in Detroit and attended the Detroit Central High School. The University of Michigan granted him his B.M.E. in 1913.

Early in his career he was associated with the Detroit Edison Co. and Albert Kahn, Inc. He spent a year in the Moscow office of Albert Kahn, Inc., as chief mechanical engineer. His first consulting office was opened in 1927. He was later associated with Giffels & Vallet, Inc., as chief mechanical engineer for a period of eight years previous to entering the partnership of Hyde & Bobbio, Inc., a decade ago.

A member of the Society since 1937, Mr. Hyde served on the TAC on Air Conditioning in Industry from 1943 to 1946. He contributed material for The Guide, and was a member of the Guide Committee, 1949-50.

Michigan Chapter selected him as its president for 1948, after he had served as vice president and two terms as treasurer. He was a member of the board of governors of the Chapter in 1944 and in 1949.

Mr. Hyde was a member of the *Engineering Society of Detroit*, Pi Tau Sigma, Tau Beta Pi, and of the Detroit Rotary Club. He was a member and former vestryman at St. James' Episcopal Church in Birmingham, Mich., where he lived.

He is survived by his wife, Mary; a daughter, Mrs. Jane Pinckley; three grandchildren; a sister, Mrs. Alfred Dunn; and three brothers, Harold G., Stanley W., and Arthur K. Hyde.

AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS

(For the location of the most recent listing of Society Officers and committee personnel, see Frontispiece, p. 129)

Presidents and Secretaries of Society Chapters and Branches

The Society has chartered 69 Chapters, 1 Overseas Branch, and 6 Student Branches. These organizations elect their own officers and governing boards. Following is a list giving the name and address of the president and secretary of each of these groups.

Date indicates year organized; an address and no city shown signifies same city as headquarters; numeral in parentheses indicates zone.

ARIZONA

Arizona: 1953. Hdqrs., Phoenix. Meets, 1st Mon. PRES, E. P. Boothroyd, 1341 W. Catalina Dr. SECY, G. L. Jackson, Jr., 932 E. San Miguel.

ARKANSAS

Arkansas: 1952. Hdqrs., Little Rock. Meets, 3rd Tues. PRES, H. H. Himstedt, 510 E. 3rd St. SECY, Allen Bullard, 509 E. Markham St.

CALIFORNIA

Golden Gate: 1937. Hdqrs., San Francisco. Meets, 1st Thurs. PRES, Herb Duncan, 938 N. Linden Ave., South San Francisco. SECY, T. R. Simonson, 507 Howard St. (5).

Sacramento Valley: 1952. Hdqrs., Sacramento. Meets, 1st Wed. PRES, M. J. Delavan, 405 Meister Way (19). SECY, R. T. Andrews, 4305 Laurelwood Way (21).

Southern California: 1930. Hdqrs., Los Angeles. Meets, 1st Tues. PRES, W. J. Biggar, 6620 Telegraph Rd. (22). SECY, R. C. Taylor, 1270 Tropical Ave., Pasadena (8).

COLORADO

Rocky Mountain: 1944. Hdqrs., Denver. Meets, 1st Wed. PRES, D. D. Pearsall, 120 W. 5th Ave. SECY, J. F. Perkis, 3453 S. Forest St. (22).

CONNECTICUT

Connecticut: 1940. Hdqrs., New Haven. Meets, 3rd Thurs. PRES, Fritz Honerkamp, 36 E. Maxwell Dr., West Hartford (7). SECY, F. J. Raible, Jr., 1007 Farmington Ave., West Hartford (7).

DISTRICT OF COLUMBIA

Washington, D.C.: 1935, Hdqrs., Washington, D.C. Meets, 2nd Wed. PRES, H. W. Rush, 116 Southwood Ave., Silver Spring, Md. SECY, L. D. Pain, 102-B Ames Rd., Silver Spring, Md.

FLORIDA

Jacksonville: 1957. Hdqrs., Jacksonville. Meets, 2nd Tues. PRES, B. J. Saymon, P.O. Box 4817 (1). SECY, G. A. Israel, Jr., 115 Park St., P.O. Box 2527 (3).

GEORGIA

Atlanta: 1937. Hdqrs., Atlanta. Meets, 2nd Mon. PRES, J. A. Marshall, 1415 Howell Mill Rd. SECY, W. P. West, 409 Bishop St., N.W. (13).

ILLINOIS

Illinois: 1905. Hdqrs., Chicago. Meets, 2nd Mon. PRES, H. E. Anderson, 530-544 Hyde Park Ave., Hillside. SECY, J. C. Scott, 3819 N. Ashland Ave. (13).

Illinois-Iowa: 1956. Hdqrs., Moline. PRES, W. W. Dodge, 3125 N. Sheridan Rd., Peoria. SECY, E. O. Hull, 1009 Ridge Rd., Peoria.

INDIANA

Indiana: 1943. Hdqrs., Indianapolis. Meets, 4th Tues. PRES, G. W. Vogel, 31 E. Georgia St. (4). SECY, J. M. Teskoski, 111 E. 34th St.

IOWA

Iowa: 1940. Hdqrs., Des Moines. Meets, 2nd Tues. PRES, W. A. Schworm, Physical Plant Dept., Iowa State College, Ames. SECY, C. B. Campbell, 3121 Dean Ave.

KANSAS

Kansas: 1951. Hdqrs., Wichita. Meets, Tues. after 1st Mon. PRES, H. M. Skalla, 2639 Sennett (16). SECY, J. C. Mikesell, 5426 E. Pine (6).

KENTUCKY

Bluegrass: 1954. Hdqrs., Louisville. Meets, 2nd Mon. PRES, O. J. Hill, 319 W. Jefferson St., Rm. 316 (2). SECY, H. L. Carr, 238 E. Main St. (2).

LOUISIANA

Baton Rouge: 1955. Hdqrs., Baton Rouge. Meets, 3rd Wed. PRES, A. W. Holland, 3958 Convention St. SECY, J. P. Jones, Box 358.

Delta: 1939. Hdqrs., New Orleans. Meets, 3rd Tues. PRES, L. R. Maxwell, 3038 Earhart Blvd. (25). SECY, J. H. Maloney, 318 Pan American Bldg. (12).

Shreveport: 1948. Hdqrs., Shreveport. Meets, 3rd Thurs. PRES, A. J. Jones, Jr., 753 Gladstone. SECY, J. L. Collins, Jr., 640 Delaware St.

MARYLAND

Baltimore: 1949. Hdqrs., Baltimore. Meets, 3rd Wed. PRES, R. E. Dressell, c/o F. M. Hewitt, 33 E. 21st St. (18). SECY, J. H. Baker, 2 E. 22nd St. (18).

MASSACHUSETTS

Massachusetts: 1912. Hdqrs., Boston. Meets, 3rd Tues. PRES, E. L. Blair, 108 Willow Ave., Wollaston (70). SECY, R. E. Reid, 313 Washington St., Newton (58).

Western Massachusetts: 1955. Hdqrs., Springfield. PRES, F. A. Ferraro, 293 Bridge St. SECY, J. J. Curran, 172 Chestnut St. (3).

MICHIGAN

Michigan: 1916. Hdqrs., Detroit. Meets, 1st Mon. after 10th of month. PRES, P. S. Hosman, 16141 Harlow Ave. (35). SECY, J. B. Olivieri, 9317 Gratiot (13).

Western Michigan: 1931. Hdqrs., Grand Rapids. Meets, 2nd Mon. PRES, B. J. Walter, 333 Fuller Ave., N.E. (3). SECY, S. R. Curtis, 1810 W. Rundle, Lansing.

MINNESOTA

Minnesota: 1918. Hdqrs., Minneapolis. Meets, 1st Mon. PRES, Fred Vogt, 6530 W. Lake St. (26). SECY, J. W. McNamara, 850 Cromwell Ave., St. Paul (14).

MISSISSIPPI

Mississippi: 1953. Hdqrs., Jackson. Meets, 4th Mon. PRES, T. D. Luke, P.O. Box 1134, 413 S. President. SECY, M. E. Arledge, P.O. Box 2324.

MISSOURI

Kansas City: 1917. Hdqrs., Kansas City. Meets, 1st Mon. PRES, S. C. McCann, 210 W. 10th St. (5). SECY, L. A. Heaven, 1529 Wyandotte (8).

St. Louis: 1918. Hdqrs., St. Louis. Meets, 2nd Tues. PRES, N. J. Hubbuch, 7020 Cornell, University City (5). SECY, K. O. Williams, 3200 Oliver Ave., East St. Louis.

NEBRASKA

Nebraska: 1940. Hdqrs., Omaha. Meets, 2nd Tues. PRES, M. F. Stober, 633 Insurance Bldg. SECY, F. P. Manchester, Jr., 1141 S. 19th (3).

NEW JERSEY

North Jersey: 1952. Hdqrs., Newark. Meets, 2nd Tues. PRES, Martin Christesen, 21 Valley Brook Dr., Emerson. SECY, L. G. Huggins, 69 Woodland Ave., Glen Ridge.

NEW MEXICO

New Mexico: 1954. Hdqrs., Albuquerque. Meets, 3rd Tues. PRES, J. K. James, 4462 Avenida del Sol, N.E. SECY, R. P. Lee, 114 Granite Ave., N.W.

NEW YORK

Central New York: 1944. Hdqrs., Syracuse. Meets, 4th Wed. PRES, Merle Weninger, 230 Goodrich Ave. SECY, S. F. Gilman, 300 S. Geddes St. (1).

Empire State Capital: 1951. Hdqrs., Albany. Meets, 2nd Wed. PRES, H. F. Kruger, 501 Seventh Ave., Troy. SECY, B. E. Mullen, Maplewood & Kraft Aves.

New York: 1911. Hdqrs., New York. Meets, 3rd Mon. PRES, C. R. Hiers, 19 Westminster Rd., Great Neck. SECY, L. D. Carr, 419 Fourth Ave. (16).

Western New York: 1919. Hdqrs., Buffalo. Meets, 2nd Mon. PRES, G. E. Kuhn, 475 Woodland Dr., Kenmore (23). SECY, D. J. Seifert, 220 Delaware Ave. (2).

NORTH CAROLINA

Northern Piedmont: 1952. Hdqrs., Greensboro. Meets, 2nd or 3rd. Fri. PRES, C. A. Cofer, P.O. Box 6267, Summit Station. SECY, B. Jeglinski, 914 Summit Ave.

Southern Piedmont: 1952. Hdqrs., Charlotte. Meets, last Mon. PRES, G. C. Garrett, P.O. Box 3697 (3). SECY, N. W. McGuire, Jr., 1202 Commercial National Bank Building (2).

OHIO

Central Ohio: 1944. Hdqrs., Columbus. Meets, 3rd Mon. PRES, T. R. Walker, 182 N. Yale Ave. SECY, J. W. Ford, 931 S. Hague Ave.

Cincinnati: 1932. Hdqrs., Cincinnati. Meets, 1st Tues. PRES, T. D. Reiley, 1905 Dunlap St. (14). SECY, E. A. Sobolewski, 3207 Hardisty Ave. (8).

Miami Valley: 1950. Hdqrs., Dayton. Meets, 1st Wed. PRES, L. P. Brehm, 315 S. Bromfield Rd. (9). SECY, N. O. Mitchell, 1441 Milburn.

Northern Ohio: 1916. Hdqrs., Cleveland. Meets, 2nd Mon. PRES, R. E. Leising, 3250 Dellwood Rd., Cleveland Heights (18). SECY, J. F. Koran, 4318 Bucyrus Ave. (9).

Toledo: 1954. Hdqrs., Toledo. Meets, 1st Mon. PRES, Robert Greenwald, 2525 Portsmouth Ave. (13). SECY, G. R. Munger, 1254 Shelly Ave., Maumee.

OKLAHOMA

Northeastern Oklahoma: 1948. Hdqrs., Tulsa. Meets, 2nd Tues. PRES, C. H. Dollmeyer, 4972 E. 26th St. SECY, R. H. Combs, P.O. Box 871 (2).

Oklahoma: 1935. Hdqrs., Oklahoma City. Meets, 2nd Mon. PRES, A. C. Shelley, 2946 Nimitz (12). SECY, W. H. Stewart. (Mail to: W. R. Johnson, 120 E. Main).

OREGON

Oregon: 1939. Hdqrs., Portland. Meets, Thurs. after 1st Tues. PRES, W. B. Hayes, 6446 N.E. 24 (11). SECY, W. S. Cooper, 445 Pittock Block.

PENNSYLVANIA

Johnstown: 1957. Hdqrs., Johnstown. PRES, W. L. Ross, 2051 Franklin St. SECY, J. K. Thornton, 712 Ferndale Ave.

Philadelphia: 1916. Hdqrs., Philadelphia. Meets, 2nd Thurs. PRES, P. H. Yeomans, 10 S. 18th St. (3). SECY, D. S. Plewes, 2853 N. 12th St. (33).

Pittsburgh: 1919. Hdqrs., Pittsburgh. Meets, 3rd Mon. PRES, E. H. Riesmeyer, Jr., 231-33 Ft. Pitt Blvd. (22). SECY, G. E. Smetak, 1238 Brighton Rd. (33).

SOUTH CAROLINA

South Carolina: 1954. Hdqrs., Columbia. Meets, 3rd Mon. PRES, B. A. Leppard, P.O. Box 3128-A, Greenville. SECY, H. J. Haar, Jr., Garner Rd., Rte. 6, Spartanburg.

TENNESSEE

Memphis: 1944. Hdqrs., Memphis. Meets, 3rd Mon. PRES, R. H. Bolding, 107 East E. H. Crump Blvd. SECY, H. W. Wade, 1530 Madison.

TEXAS

Austin: 1956. Hdqrs., Austin. Meets, 3rd Thurs. PRES, A. C. Lagow, 4506 Oakmont Blvd. SECY, Prof. J. R. Watt, M. E. Dept., University of Texas (12).

El Paso: 1956. Hdqrs., El Paso. Meets, 3rd Mon. PRES, G. H. Jackson, 1601 Bassett St., P.O. Box 512. SECY, M. W. Schlessinger, 4510 Nashville Ave.

Fort Worth: 1957. Hdqrs., Fort Worth. Meets, 3rd Wed. PRES, C. R. Gardner, P.O. Box 11173 (10). SECY, J. K. Mattox, Jr., 1705 Scenery Hill Rd.

North Texas: 1938. Hdqrs., Dallas. Meets, 3rd Mon. PRES, G. H. Meffert, 2025 Cedar Springs Ave. (1). SECY, J. D. Poythress, P.O. Box 35226 Airlawn Station.

South Texas: 1938. Hdqrs., Houston. Meets, 3rd Fri. PRES, J. C. Lewis, Box 8188. SECY, E. B. Appling, 4101 San Jacinto St. (4).

Southwest Texas: 1946. Hdqrs., San Antonio. Meets, 3rd Tues. PRES, Prof. C. L. Herndon, San Antonio College, 1300 San Pedro Ave. (12). SECY, L. A. Ingle, Jr., 722 Hildebrand.

West Texas: 1953. Hdqrs., Lubbock. Meets, 1st Tues. PRES, H. L. Mayes, Box 151. SECY, W. R. Anthony, 902 E. 34th St.

UTAH

Utah: 1944. Hdqrs., Salt Lake City. Meets, 3rd Thurs. PRES, Alfred Richeda, P.O. Box 479 (9). SECY, E. V. Gritton, 2470 S. 15th (5).

VIRGINIA

Virginia: 1946. Hdqrs., Norfolk. Meets, 3rd Wed. PRES, D. C. Delinger, 424 W. 21 St. (10). SECY, J. A. Hoffman, 9522 Wells Pkwy.

WASHINGTON

Inland Empire: 1950. Hdqrs., Spokane. Meets, 1st Mon. PRES, J. A. Doyle, W. 3018 Broad. SECY, J. R. Morris, 5812 North C St.

Puget Sound (Formerly Pacific Northwest): 1928. Hdqrs., Seattle. Meets, 2nd Tues. PRES, E. W. Triol, 407 Medical Arts Bldg. SECY, R. H. Liniger, 1303 E. Lynn St. (2).

WISCONSIN

Wisconsin: 1922. Hdqrs., Milwaukee. Meets, 3rd Mon. PRES, H. W. Alyea, 507 E. Michigan St. (2). SECY, A. A. Stutheit, 2697 S. Kinnic Kinnic Ave. (7).

CANADA

British Columbia: 1952. Hdqrs., Vancouver. Meets, 2nd Wed. PRES, A. C. Martin, 425 W. Second Ave. (10). SECY, W. F. Wiggins, 1128 Burrard St. (1).

Chapitre de la Ville de Quebec: 1956. Hdqrs. Quebec, P.Q. PRES, Jean Veilleux, 350 E. Charest Blvd. SECY, R. A. Harnois, 604 St. John St., Rm. 203.

Manitoba: 1935. Hdqrs., Winnipeg. Meets, 4th Thurs. PRES, R. M. Fraser, 1855 Sargent Ave. SECY, J. J. MacKenzie, 45 Olivia St.

Montreal: 1936. Hdqrs., Montreal. Meets, 3rd Mon. PRES, D. J. McIntyre, Lafleur Bldg., Rm. 300, 3600 Barclay Ave. SECY, Paul Thibault, 4350 Sherbrooke St. W.

Northern Alberta: 1956. Hdqrs., Edmonton. Meets, 3rd Wed. PRES, P. M. Butler, 509 Northern Hardware Bldg. SECY, G. N. Campbell, 10124 104th St.

Ontario: 1922. Hdqrs., Toronto. Meets, 1st Mon. PRES, C. L. Torry, 117 Glengrove Ave. W. SECY, H. R. Roth, 57 Bloor St., W. (5).

Ottawa Valley: 1952. Hdqrs., Ottawa. Meets, 3rd Tues. PRES, C. W. Watson, 102 Bank St., Rm. 3. SECY, A. H. Hargreaves, Dept. of Public Works (2).

OVERSEAS BRANCH

Switzerland: 1952. Hdqrs., Zurich. PRES, Albert Eigenmann, Seestr. 105 (2). SECY, Hans Kamm, Spitalgasse 30, Bern.

STUDENT BRANCHES

North Carolina State College: 1948. Faculty Adviser: Prof. R. B. Knight, M. E. Dept., Raleigh, N. C.

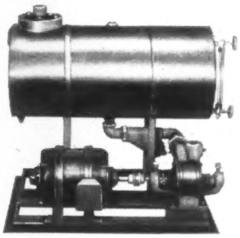
Oregon State College: 1949. Faculty Adviser: Prof. G. E. Thornburgh, M. E. Dept., Corvallis, Ore.

Purdue University: 1948. Faculty Adviser: Prof. F. B. Morse, M. E. Dept., West Lafayette, Ind.

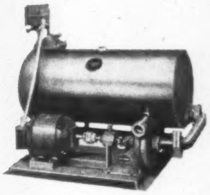
Texas A. & M. College: 1946. Faculty Adviser: Prof. L. S. O'Bannon, M. E. Dept., College Station, Tex.

University of Detroit: 1949. Faculty Adviser: Prof. J. E. Lay, M. E. Dept., Detroit, Mich.

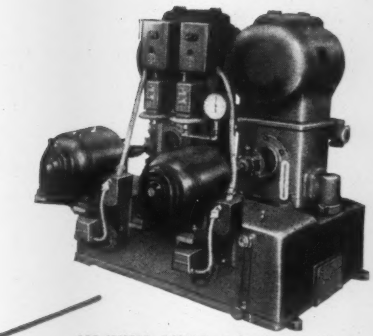
University of Toronto: 1951. Faculty Adviser: Prof. F. G. Ewens, M. E. Dept., Toronto, Ont., Canada.



TYPE "TM" TURBINE PUMP



TYPE "HS" CONDENSATE PUMP



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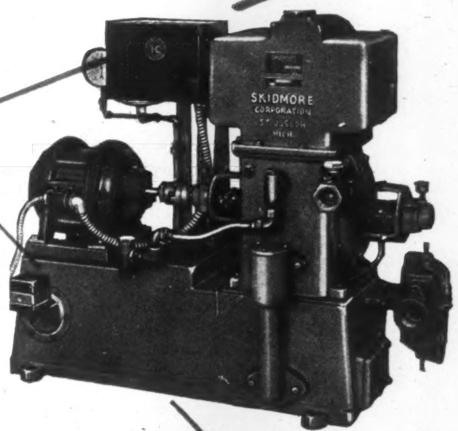

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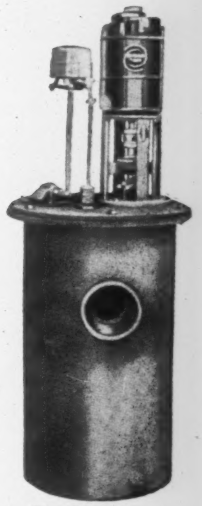

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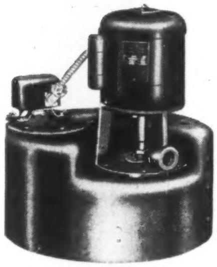

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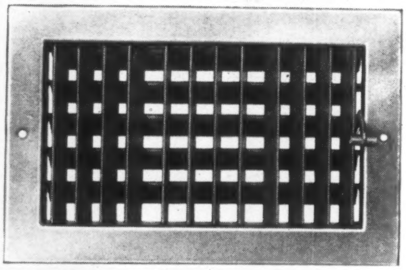
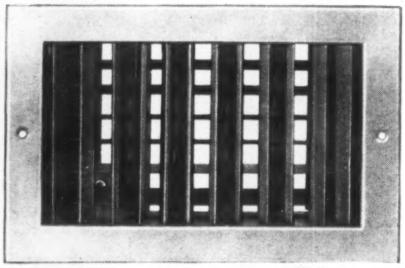
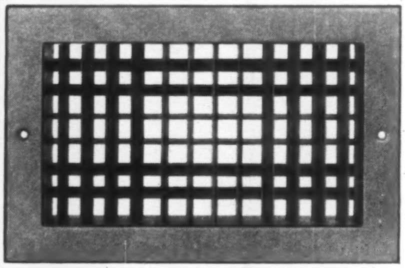


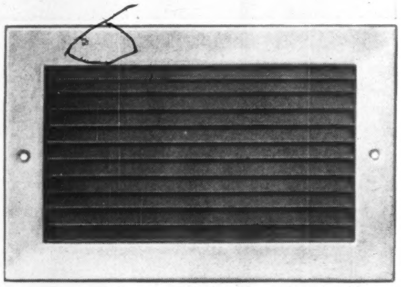
Style 1VMH Supply Register
One set adjustable vertical louvres with multi-shutter damper, horizontal blades.



Style 2VO Supply Register
Two sets of adjustable louvres, front vertical, second horizontal with opposed damper, vertical blades.



Style 2V Supply Grille
Two sets of adjustable louvres, front vertical, rear horizontal.



Style 3H Return Air Grille
One set of horizontal fins fixed down at 45° deflection . . . Also available in 0° deflection.

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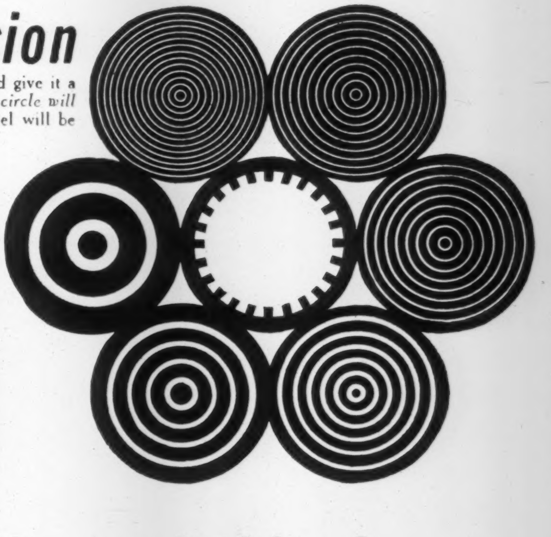
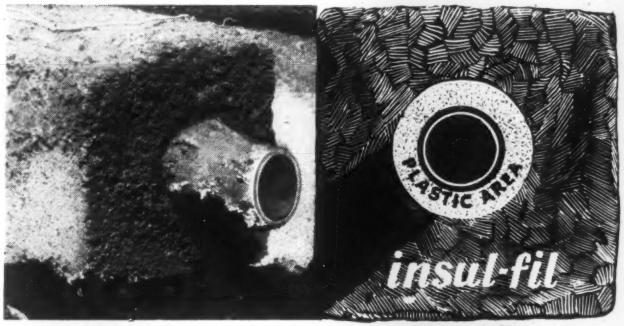
This is an illusion

HOLD this Diagram by the right hand bottom corner and give it a slight but *rapid* circular twisting motion, at which time *each circle will separately revolve on its own axis.* The inner cogged wheel will be seen to revolve in an opposite direction.





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INSUL-FIL	.451
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WEIL-McLAIN "HR" BOILER

HEAVY DUTY UNITS FOR HORIZONTAL ROTARY BURNERS USING HEAVY OIL

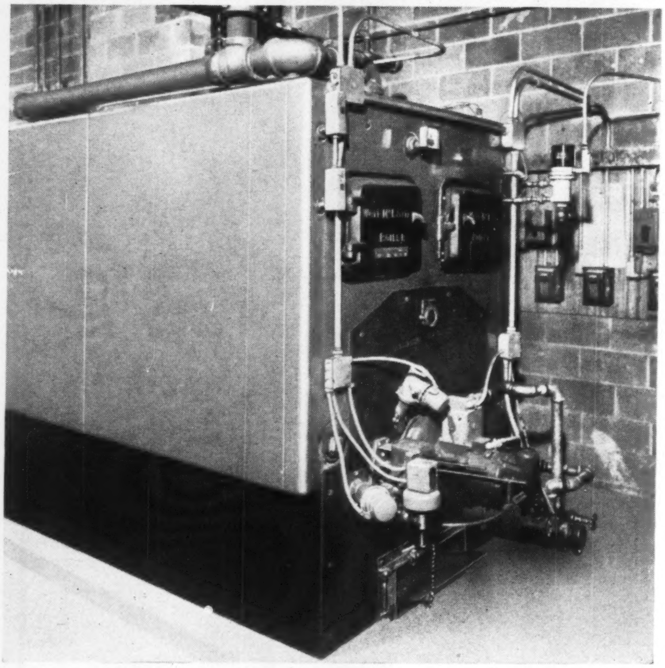
For burning low-cost heavy oils, the Weil-McLain "HR" Boiler offers an exceptional list of proved advantages...in operating efficiency ...smaller space requirements...easy installation...and long life.

"HR" Boiler ratings are based on I-B-R tests with adjustment for rotary burner operation. *These ratings are the result of actual tests and not formulated on measurements of heating surface!* They are certified by the Weil-McLain Company and listed in the Net Load Recommendations of the Mechanical Contractors' Association of America.

The extra high base of the "HR" Boiler makes available ample room for a large combustion chamber—particularly necessary when burning Nos. 5 and 6 oils. *Complete combustion chamber data is available for each size boiler and type of burner.*

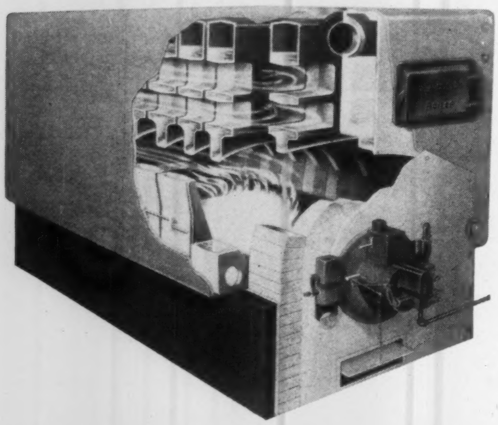
Maximum heating surface is placed directly over the fire, assuring more heat transmission by direct radiation. The flueways are designed to provide a *balanced* back-and-forth flue gas travel for thorough heat absorption.

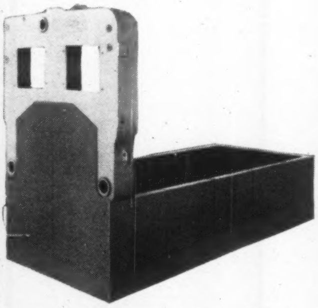
For complete data, send for Bulletin C-188.



Typical installation of 66 H.P. Weil-McLain "HR" Boiler in Wilmington, Del., manufacturing plant.

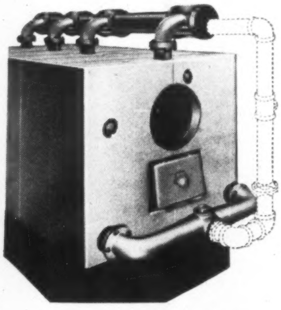
Contractor: Leon E. Wilkins, Wilmington. **Distributor:** Desco Corporation, Wilmington





SPECIAL STEEL FRONT PLATE

A steel plate provided by the factory is bolted to the front sections to simplify burner mounting. The plate has a scribed center line for use in locating the openings required by the various parts of the burner. Upon request, openings can be cut at the factory for specific makes of burners. By installing a wind box on the front plate, "HR" Boilers can be adapted to combination gas-oil burners.



"EASY-FIT" HEADERS

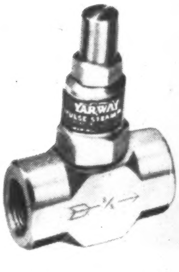
This steam supply header eliminates many erecting problems and cuts installation time. Machined and pre-fitted at the factory, it is shipped partially assembled. Dresser compression fittings are employed to assure a flexible connection between header and boiler and to prevent expansion strains. Return headers are also available for steam and water boilers.

WEIL-McLAIN
BOILERS · RADIATORS

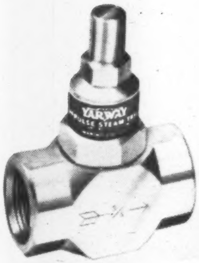
WEIL-McLAIN COMPANY
MICHIGAN CITY, INDIANA

Address literature requests to Dept. AA-107

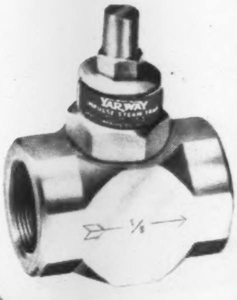
½" No. 60 or 120



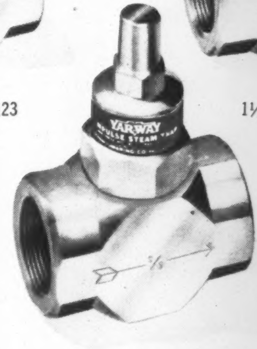
¾" No. 61 or 121



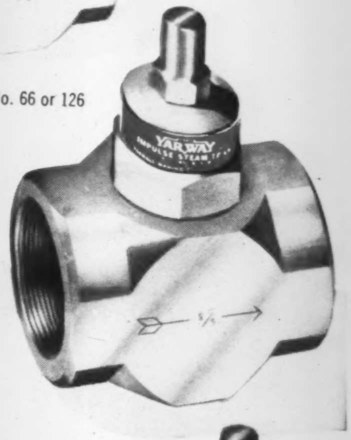
1" No. 63 or 123



1½" No. 66 or 126



1¼" No. 64 or 124



2" No. 67 or 127

all of these steam traps are impulse!

Take your choice! There is a Yarway Impulse Steam Trap for practically every trapping requirement in your plant.

Revolutionary when introduced 20 years ago, the *Yarway Impulse* principle has been proved by more than a million in service everywhere, is still gaining new friends every day.

SERIES 60—for *normal steam trap requirements;* pressures to 400 psi, temperatures to 450° F. Stainless steel body and working parts. Six sizes, ½" to 2".

NO. 20-A—available in ½" size only— similar to ½" #60, but with low capacity—designed especially for *light condensate loads.*

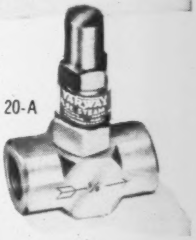
SERIES 120—same as Series 60 but for higher pressures and temperatures (600 psi, 750° F). Featuring all-stainless steel construction. Six sizes, ½" to 2".

SERIES 40—for *heavy condensate loads* requiring high capacity traps. Sizes ½" to ¾" in stock, larger sizes (1½", 2", 2½") available.

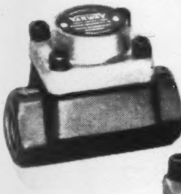
INTEGRAL STRAINER TRAPS—for marine use and for high pressure trapping service in steam power plants with pressures up to 2500 psi. Six sizes, ½" to 2"; flanged and socket-welding ends.

All Yarway Impulse Steam Traps are available through 270 convenient local Industrial Distributors. For descriptive bulletin on any type of Impulse Trap, write . . .

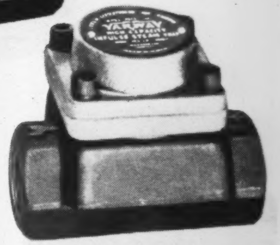
YARNALL-WARING COMPANY
107 Mermaid Avenue, Philadelphia 18, Pa.



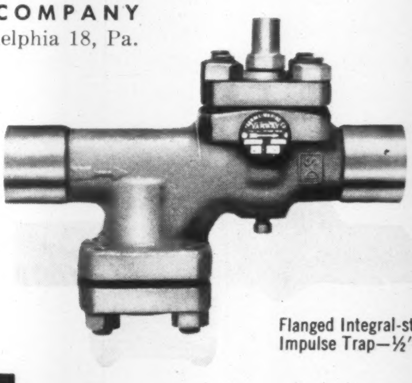
½" No. 20-A



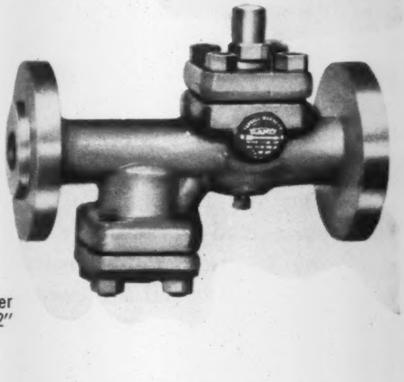
½" No. 40



¾" No. 41



Socket-weld Integral-strainer
Impulse Trap—½" to 2"



Flanged Integral-strainer
Impulse Trap—½" to 2"

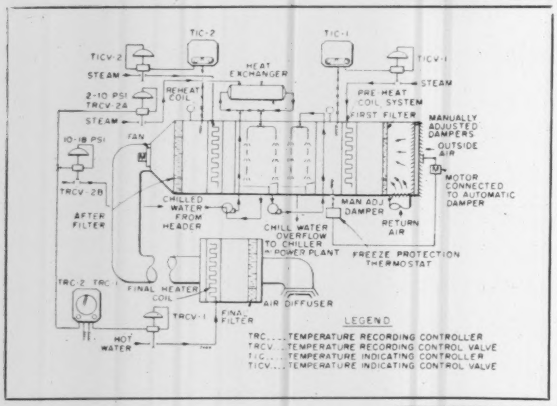
YARWAY IMPULSE STEAM TRAPS

The Impulse that revolutionized steam trapping 20 years ago

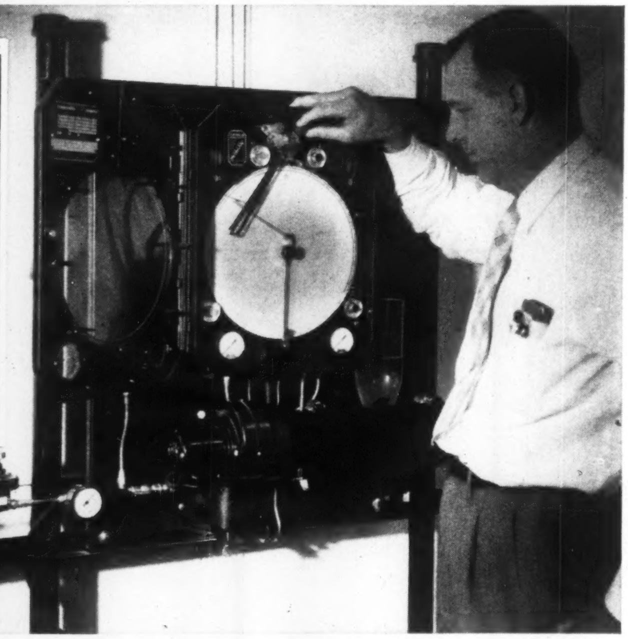
TAYLOR-CONTROLLED

"Atmosphere Conditioning"

BUILT INTO HALOID'S NEW PLATE PLANT


TIC-2
TIC-1
TICV-2
TICV-1
STEAM
HEAT EXCHANGER
STEAM
2-10 PSI
TRCV-2A
REHEAT COIL
PRE HEAT COIL SYSTEM
FIRST FILTER
STEAM
MANUALLY ADJUSTED DAMPERS
FAN
10-18 PSI
OUTSIDE AIR
MOTOR CONNECTED TO AUTOMATIC DAMPER
TRCV-2B
CHILLED WATER FROM HEADER
MAN ADJ DAMPER
AFTER FILTER
RETURN AIR
CHILL WATER OVERFLOW TO CHILLER IN POWER PLANT
FREEZE PROTECTION THERMOSTAT
TRC-2 TRC-1
FINAL HEATER COIL
AIR DIFFUSER
TRCV-1
FINAL FILTER
HOT WATER
LEGEND
TRC....TEMPERATURE RECORDING CONTROLLER
TRCV...TEMPERATURE RECORDING CONTROL VALVE
TIC....TEMPERATURE INDICATING CONTROLLER
TICV....TEMPERATURE INDICATING CONTROL VALVE

Schematic drawing of temperature-humidity control system.



Norman Clark, Haloid engineer, adjusts FULSCOPE double-duty temperature recording controller.

"It's not a building
... it's a machine,"

said the builder of the new XEROX® plate plant, for the Haloid Company, Inc., Rochester, N.Y.

Cleanliness is crucial in this plant for manufacturing photo-sensitive XeroX plates, and Taylor controls were specified for the intricate, built-in air conditioning system. The key instrument in each section of the building is a double-duty FULSCOPE* recording controller, like the one shown above. It keeps close automatic control over temperature and humidity for its respective zone—day in, day out. This instrument, with close-connected wet and dry bulbs, is placed in the zone location most desirable for critical control. Conditioned air controlled from this point is distributed to many smaller and less critical areas, such as associated offices and utility rooms.

The Haloid Company chose Taylor controls for this job, because of its complete satisfaction with a previous Taylor installation in its photographic paper drying tunnels.

Taylor has the instrumentation and the know-how to provide the answer to many tricky problems in the field of air conditioning. Ask your Taylor Field Engineer or write the Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

*Reg. U.S. Pat. Off.

Taylor Instruments
MEAN
ACCURACY FIRST

VISION · INGENUITY · DEPENDABILITY

117 MODINES to fit *any* heating job

MODINE UNIT HEATERS
SUMMER COMFORT ALL WINTER LONG
The Magnificent Modine

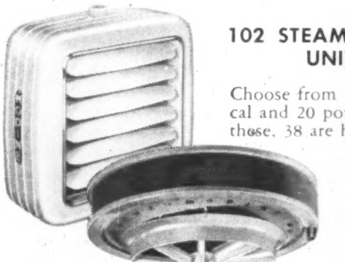
Portion of typical Modine distributor's stock. Write for names of stocking wholesalers nearest you.

any type, any size, any style

It's easier to meet exact heating requirements when you're selecting unit heaters from the complete Modine line No matter what the mounting height, temperature or heat-throw demands—Modine has the answer. And buyers are assured of highest quality *because Modine designs and manufactures its own unit heaters.*

- Modine steam and hot water units provide perfect heating comfort at lowest possible fuel costs because the discharge temperatures are correctly related to heat throw and air volume.
- Modine's gas-fired unit heaters last longer, cost less to install. Direct firing of tubes and reduction of heat exchanger mass give you heat within seconds.

For all the facts, see the Modine representative listed in your classified telephone directory. Or you can write directly to Modine Mfg. Co., 1509 DeKoven Avenue, Racine, Wisconsin.



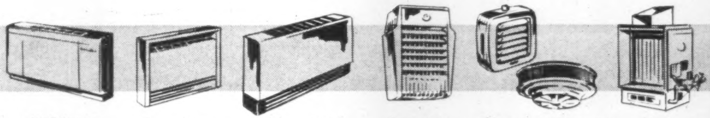
102 STEAM OR HOT WATER UNIT HEATERS

Choose from 38 horizontal, 44 vertical and 20 power throw models. Of these, 38 are high corrosion resistant (HCR) models, 48 are low outlet temperature models. Write for a copy of Bulletin 157

U-1361

15 GAS-FIRED UNIT HEATERS

All Modine gas-fired units have stainless steel burners. Eight models also feature *stainless steel* heat exchangers. The other 7 are equipped with *aluminized steel* heat exchangers. For more information on these outstanding units write for Bulletin 657


AIRditioners
Convectors
Cabinet units
Gas unit heaters
Steam & hot water unit heaters
Duct furnaces

In Canada: Sarco, Ltd., Toronto

Modine
MANUFACTURING COMPANY

Pittsburgh Superfine is applied to Rheem Heater panels. Superfine cuts standby heat loss, increases heater efficiency far above the 80% required by gas and oil companies.

Plant Manager Gordon Cheasley reports that Superfine saves production time and shipping costs, is safer to work with than previous insulating material.

"Thanks to Pittsburgh Superfine, Rheem heaters have the best insulation in the industry!"

says Mr. Gordon L. Cheasley, Plant Manager, HOME PRODUCTS DIVISION
RHEEM MANUFACTURING COMPANY, NEW CASTLE, DELAWARE

"The use of Pittsburgh Superfine helps Rheem five ways in the production of our heaters," reports Mr. Cheasley.

1. **Low heat loss—increased efficiency.** "Pittsburgh Superfine cuts the standby loss of heat in our units and has increased their efficiency to far above the 80% required for approval by gas and oil companies."
2. **Constant resiliency.** "We ship several models disassembled in cartons. Superfine is compressed for packing; yet after a year's compression time, Superfine 'bounces' right back to its original thickness."
3. **Faster production.** "Superfine's lightweight factor saves handling time. Cutting is done quickly and easily. One man can cut, place insulation on eight panels per unit, and pack 25 units a day for shipping."
4. **Safer to work with.** "The insulation material we previously used caused employees discomfort and skin irritation due to glass particles working loose. Superfine's superior quality eliminated this, ended complaints and raised employee morale."
5. **Lower shipping costs.** "Lightweight Superfine saves us 10 lbs. in total weight shipped per carton of panels . . . an important cost-saving factor."

Have you tried Superfine?

Pittsburgh Superfine is ideal for all types of heat and cold insulation, and for sound deadening, too. Get the complete Superfine story from your local PPG Sales Office, or write *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Penna.*

PITTSBURGH SUPERFINE IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh and St. Louis

FIBER PG GLASS

PAINTS · GLASS · CHEMICALS · BRUSHES · PLASTICS

PITTSBURGH PLATE GLASS COMPANY

BLAW-KNOX has what it takes
—to provide these products and services

PIPING SYSTEMS

for all pressures and temperatures

Engineer
—to meet specific requirements

Compute
—piping stress analysis by using digital computer

Prefabricate
—in shop and field
pipe bends • expansion bends
headers • manifolds

Erect
—in field

Send for Bulletin No. 2443—"Piping for Industry"

HANGERS and SUPPORTS

for all types of piping installations

Design
—to meet specific requirements

Manufacture
—to comply with "code for pressure piping"

- functional spring hangers
- constant support spring hangers
- rigid hanger assemblies
- overhead roller assemblies
- supports
- vibration eliminators

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AUTOMATIC SPRINKLER SYSTEMS

for maximum protection against fire

Engineer
—to meet specific conditions

Fabricate

- spray sprinkler systems
- rate-of-rise systems
- CO_2 systems
- water fog equipment
- foam equipment

Install
—to comply with insurance standards
and municipal codes

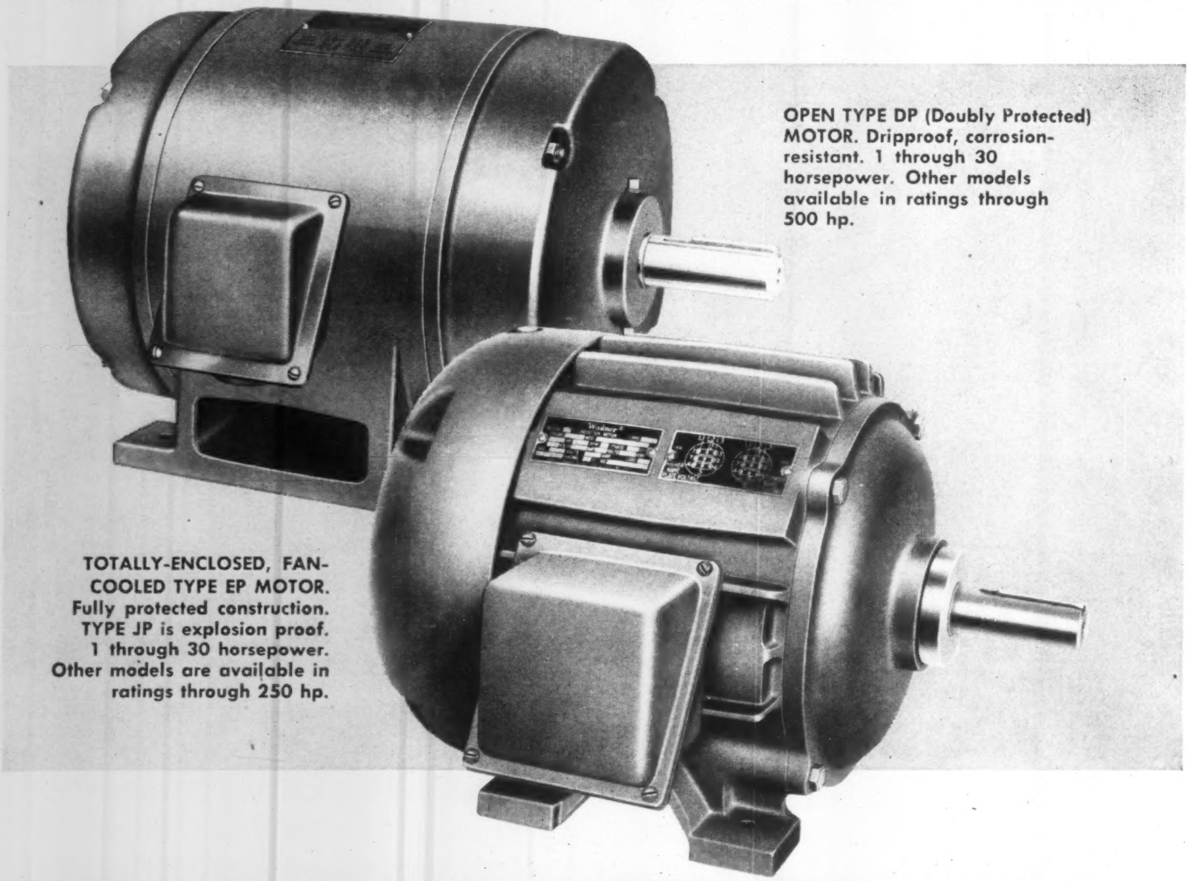
Write for Bulletin No. 2426
—"Fire Can Destroy Your Business"

Write us about your requirements for any or all of these products and services. Our experienced engineers will be glad to help you.

BLAW-KNOX

BLAW-KNOX COMPANY
Power Piping and Sprinkler Division
829 Beaver Avenue • Pittsburgh 33, Pennsylvania

WAGNER ELECTRIC MOTORS...THE CHOICE OF LEADERS IN INDUSTRY



OPEN TYPE DP (Doubly Protected) MOTOR. Dripproof, corrosion-resistant. 1 through 30 horsepower. Other models available in ratings through 500 hp.

TOTALLY-ENCLOSED, FAN-COOLED TYPE EP MOTOR. Fully protected construction. TYPE JP is explosion proof. 1 through 30 horsepower. Other models are available in ratings through 250 hp.

OPEN TYPE OR TOTALLY ENCLOSED MOTORS...

Wagner offers MORE for your motor dollar!

- **MORE POWER IN LESS SPACE**... These motors are built in NEMA frame sizes 182 through 326 U. They pack more power into less space for easier handling and stocking—require less space for installations.
- **CORROSION-RESISTANT FRAMES** ... Both types are built with rugged, corrosion-resistant cast iron frames. Motor feet are cast as an integral part of the frame for maximum strength and rigidity.
- **THE TYPE OF PROTECTION YOU NEED** ... Type DP motors have completely dripproof—virtually splash-proof enclosures; while type EP is totally enclosed, fan-cooled for complete protection; and type JP adds explosion proof features.
- **COOLER OPERATION** ... Special baffles direct a cooling flow of air through the DP motor. Types EP and JP are fan-cooled and have ribbed frames to increase the surface area for more efficient cooling.
- **LONGER BEARING LIFE** ... These motors can be re-greased when desired to prolong bearing life. Fresh grease can be added—old grease removed through openings provided in the bearing housing.
- **WAGNER DEPENDABILITY** ... These two motors have the same high Wagner quality, will give the same long life performance, that have made Wagner Motors a *known* value for sixty-five years.
- Let a Wagner field engineer, expert on motor applications, show you how these motors can be applied to your needs. Call the nearest of our 32 branch offices, or write us. Bulletins MU-202 and MU-203 give complete information on these Wagner Motors. Write for your file copies today.

M57-4

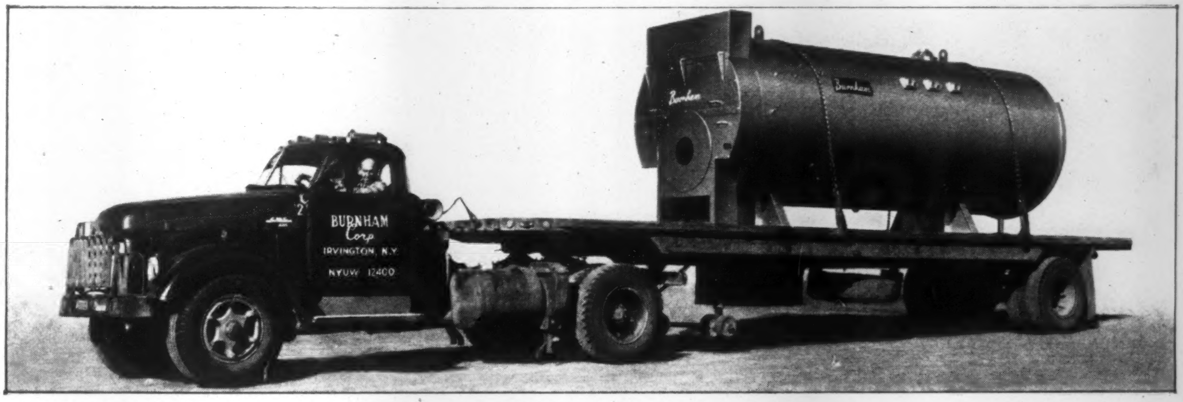
Wagner
Electric Corporation
SERVING INDUSTRY SINCE 1891

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation
6370 Plymouth Ave., St. Louis 14, Mo., U.S.A.

VISIT US AT BOOTH 672—10TH EXPOSITION, AIR CONDITIONING AND REFRIGERATION INDUSTRY

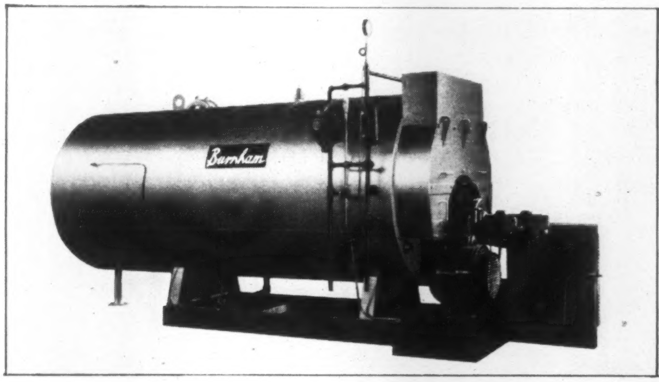
BURNHAM Scotch Type Boilers Are NOW Available As Completely Packaged Units

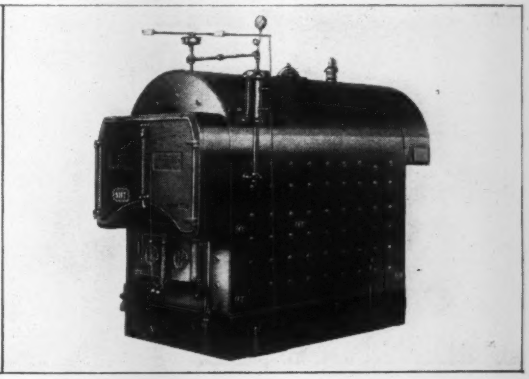


STANDARD SCOTCH TYPE with WIND BOX — ready for fast, on-the-job delivery

All Burnham Scotch Type Steel Heating Boilers conform fully to S.B.I. ratings and low pressure A.S.M.E. boiler code construction. Skilled craftsmen have built them to the finest standards of the industry. Capacities from 2,600 to 35,000 sq. ft. E.D.R. steam and from 4,680 to 56,000 sq. ft. E.D.R. water, net S.B.I. ratings.

Special Burnham Trailer Trucks assure fast delivery and efficient unloading.





COMPLETE PACKAGE, READY TO GO

This 7,000 sq. ft. boiler and combustion unit were teamed after consultation with many burner experts and extensive testing. Through the entire line, Burnham has built the finest in boilers . . . then studied the output of many leading burner manufacturers to select the finest and most suitable combustion units.

BURNHAM COMPACT TYPE BOILER

These welded steel Compact Type Boilers compress the utmost heating capacity into the practical minimum of floor space. Available in capacities from 2,600 to 35,000 sq. ft. E.D.R., steam and with comparable water ratings — all S.B.I.

Stock Boilers available for prompt shipment.

Burnham Corporation

Burnham
RADIANT HEATING
SINCE 1873

STEEL BOILER DEPARTMENT
IRVINGTON, NEW YORK

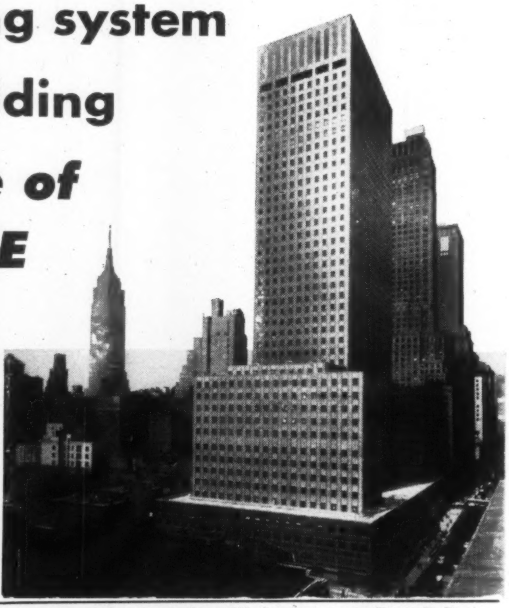
STEEL BOILER INSTITUTE
SBI
HEATING · PROCESS · POWER

HP-107

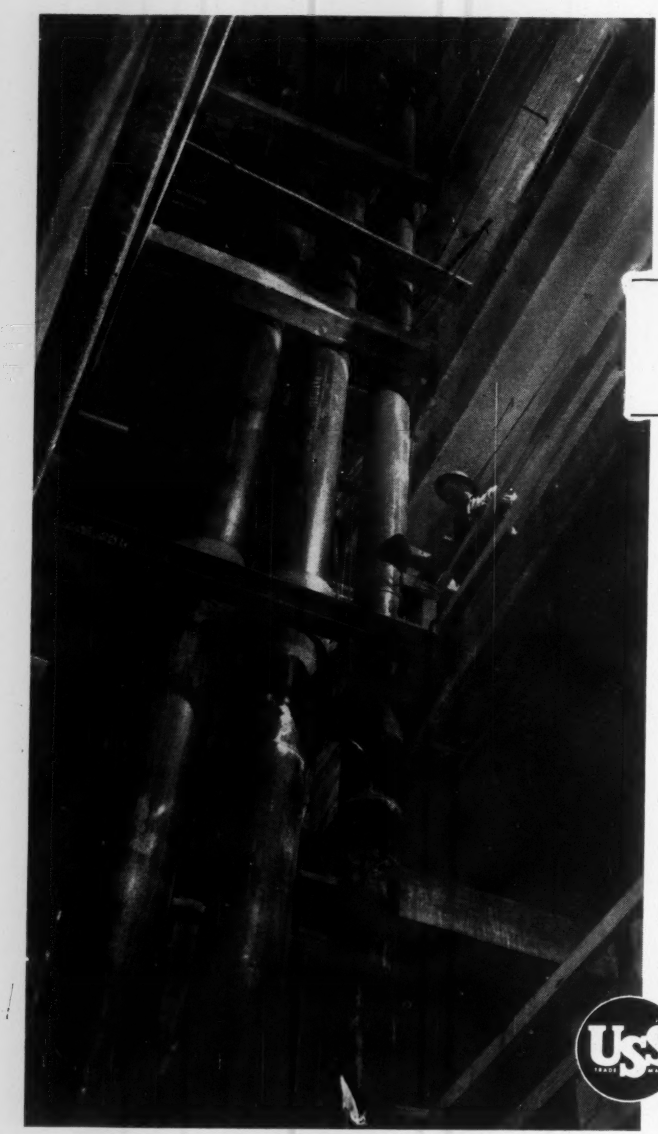
Burnham Corporation
Steel Boiler Department
Irvington, New York

Please give me, without obligation, full ratings and data on:
Scotch Type Boilers ☐ **Boiler-Burner Packages** ☐
Compact Boilers ☐
Name . . . .
Address . . . .
City . . . . **State** . . . .

Ingenious air-conditioning system of Socony-Mobil Building *makes liberal use of* ***NATIONAL PIPE***



Owner: Galbreath Corp., John W. Galbreath and Peter B. Ruffin
Architects: Harrison & Abramovitz
Associated Architect: John B. Peterkin
General Contractor: Turner Construction Company
Mechanical Engineers: Jaros, Baum & Bolles
Plumbing Contractor: Eugene Duklauer, Inc.
Heating, Ventilating & Air Conditioning Contractor: Kerby Saunders, Inc.



This gleaming, 45-story, stainless-steel-sheathed building is the largest air-conditioned office building structure ever erected. Its remarkable air-conditioning system is powered by purchased steam, which is actually used twice. In the basement there is a refrigeration plant, consisting of 3 centrifugal steam turbine driven compressors of 2600-ton capacity. These 3 units are driven by steam turbines operating full condensing, with the exception of one which is a partial condensing and exhaust. This exhaust steam, by means of a 10-inch steam main, is tied in with the building's steam distribution system. This 10-inch main serves, during summer operation, all the steam requirements for the tempering coils in the air-conditioning system, as well as the steam required for three 500 Lithium Bromide Absorption Machines. In other words, the three 500-ton units act as a surface condenser for the exhaust steam—the building enjoying the economics of this ingenious piping layout.

Approximately 470 tons of USS National Pipe—most of it Seamless—were used in the construction of the air-conditioning and heating systems. And at least 350 tons of National Seamless were used in the huge building's plumbing system.

As is so often the case in designing complex plumbing and heating systems, the engineers selected National Pipe. They knew from past experience that, no matter how rigorous the conditions, National would do the job, and do it well.

If you'd like more information on the use of National Pipe in plumbing and heating, air-conditioning and power installations—large or small, simple or complex—get in touch with us. Our experienced engineering staff is at your service.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

NATIONAL PIPE

UNITED STATES STEEL

Air Conditioning, Ordering, Installing, Maintaining — Now Made Easier For You . . .

SATISFABRICATED
by
GOVERNAIR
SCU

Yes! SATISFABRICATED! ©

It's our way of telling the world that Governair Products are guaranteed to satisfy the widest range, the most exacting capacities, and the most truly unusual space requirements.

Governair offers a SPECIAL saving of time and trouble with its complete line of Self-Contained Units. They're easier to order, since you specify only one unit in place of picking several components. Easier to install, too, since they are delivered fully tested and ready to operate with simple electrical, water and duct connections.

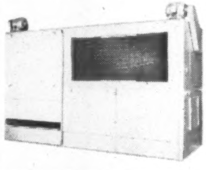
Best of all, Governair's quality engineering and construction assure you of lower cost maintenance so important to the purchaser.

WRITE OR CALL FOR DETAILED INFORMATION.

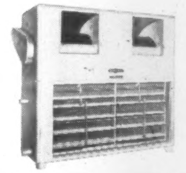
GOVERNAIR CORPORATION
4840 NORTH SEWELL
OKLAHOMA CITY, OKLA.

GOVERNAIR

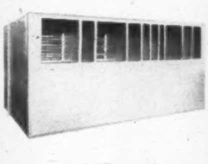
SELF CONTAINED AIR CONDITIONERS



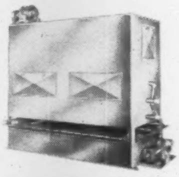
FAN & COIL UNITS



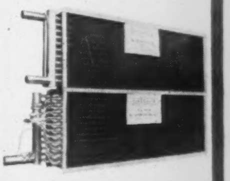
MULTI-ZONE FAN & COIL UNITS

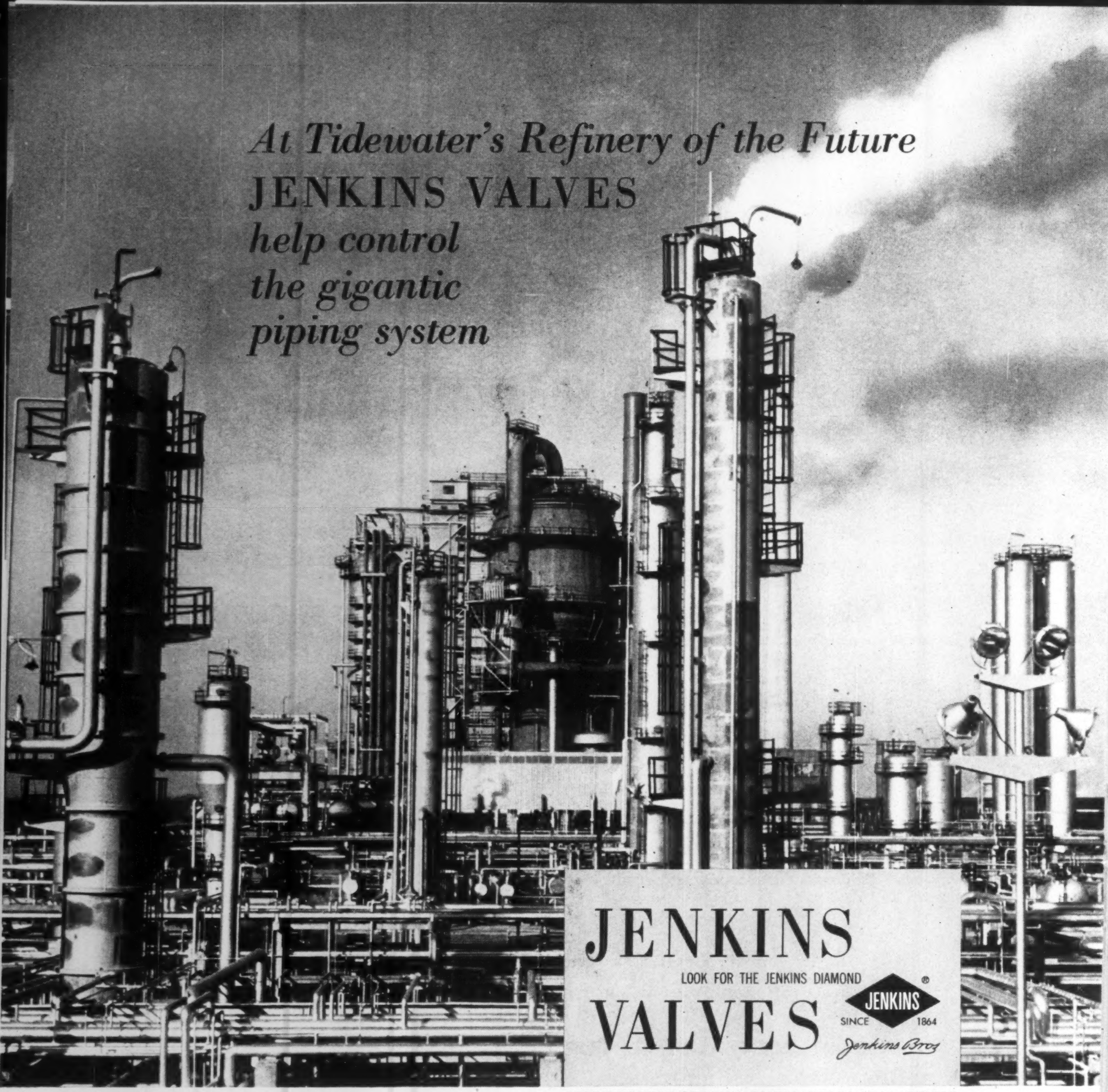


EVAPORATIVE CONDENSER



COILS HEATING & COOLING




At Tidewater's Refinery of the Future
JENKINS VALVES
help control
the gigantic
piping system
JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES
JENKINS
SINCE 1864
Jenkins Bros

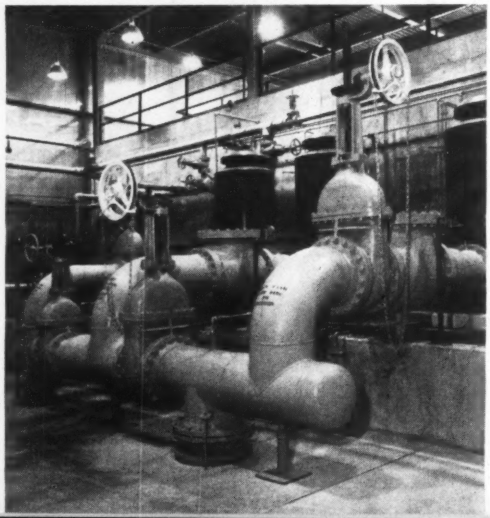
Primary Contractor: C. F. BRAUN & CO., ALHAMBRA, CAL.

SOLD THROUGH LEADING DISTRIBUTORS EVERYWHERE

For the new Delaware Refinery of Tidewater Oil Company, careful selection of valves was unusually important. Tens of thousands of valves were required to control the maze of piping at this largest refinery ever built at one time.

To the valve specifiers for this gigantic piping project, the long record of Jenkins Valves for an extra-measure of efficient, economical service was good reason for using many thousands of Jenkins Valves in the total valve equipment of the refinery.

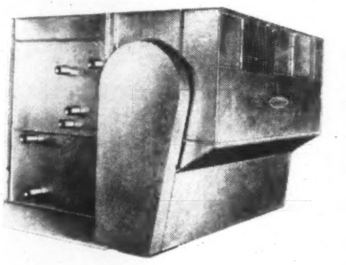
It will pay you to have the same important assurance when you specify or install valves . . . especially since Jenkins Valves cost no more. Jenkins Bros., 100 Park Avenue, New York 17.



These large valves made of Ni-Resist metal are among the thousands of Jenkins Valves in this great refinery. Sizes range from ¼″ to 24″; made of various metals to suit different services.

EQUIPMENT DEVELOPMENTS . . .

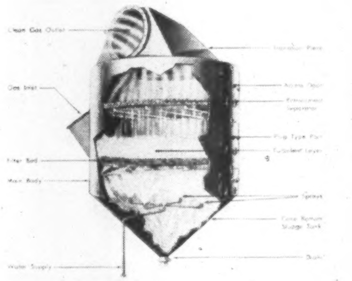
For reviews of Recent Trade Literature see Page 240



Condensers . . .

. . . for large air conditioning, refrigeration systems — *Carrier Corp., Dept. HPAC, Syracuse* 1, *N. Y.*

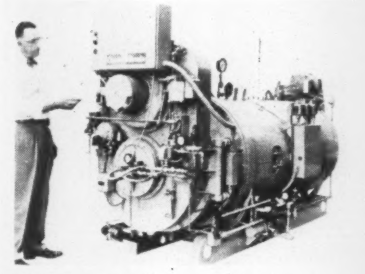
Models use evaporation of water or passage of air over condensing coils to remove heat from refrigerant. Designed to offer more compact installation, lower operating costs. Evaporative type available in 13 sizes 5 to 250 tons capacity. Air cooled type produced in seven sizes 2 to 39 tons capacity. Operating noise reduced by use of centrifugal fan, company says.



Dust Collectors . . .

. . . designed to use single settling tank or basin — *National Dust Collector Corp., Dept. HPAC, 700 Machinery Hall, Chicago 6.*

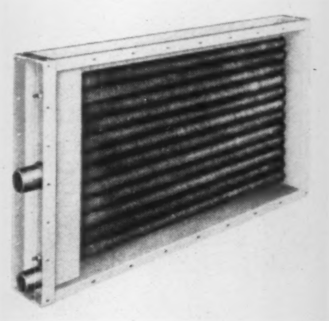
New "Type IC Hydro-Filter" offers centralization of sludge collection operation, equipment to provide more economical pickup, disposal, manufacturer says. Features cited: single sludge conveyor can serve several collectors, longer settling time derived with large settling area, lower fresh water consumption. Unit can be elevated above floor level. Recommended by company for easy maintenance due to simplicity of design, continual flushing of interior surface, absence of baffles.



Oil Heater . . .

. . . for process temperature requirements to 600 F — *Cleaver-Brooks Co., 326 E. Keefe Ave., Milwaukee* 12.

New direct fired unit heats transfer oils or other liquids. Forced internal circulation design provides high velocity flow of heat transfer oil over heating surfaces; uniform oil temperature eliminates hot spots, coking, deterioration, company says. Operates with oil, gas or combination oil, gas. Heater is closed type, horizontal fire tube design.



Steam Distributing Coil . . .

. . . designed to resist freezing — *American Blower, Div. of American-Standard, Dept. HPAC, Detroit* 32.

"Type D1" 1 in. unit available with one or two tube rows deep in single section for variety of casing sizes. New spacer design is used for positive centering of inner tube allowing condensate to drain rapidly, completely, company says. Casings are zinc coated heavy gage steel. Coils available with fins of aluminum or solder bonded copper. Headers are heavy welded steel plate with high temperature brazed inner, outer tubes. Units recommended by company for steam at 200 psig, 450 F.

Control Center . . .

. . . for regulating heating, cooling systems in large buildings — *Minneapolis-Honeywell Regulator Co., Dept. HPAC, 2753 Fourth Ave., S., Minneapolis* 8.

Two slides designed to enable operator to observe temperature situation in any part of building. One

EQUIPMENT DEVELOPMENTS

Continued

shows fan system layout; other gives floor plan of each controlled area, tells which thermostats are controllable from panel. Unit is 8 ft long, features pushbutton control of all functions including intercommunication system.

Socket-End Valve . . .

. . . for installation in PVC pipe lines by solvent welding — *Lunkenheimer Co., Dept. HPAC, Box 360, Cincinnati 14.*

Units have been successful in handling most common corrosive solutions in industrial operations, chemical processing, marine installations, company says. High strength and weight ratio give them rigidity. Rated 125 WP, 140 F.

Registers, Grilles . . .

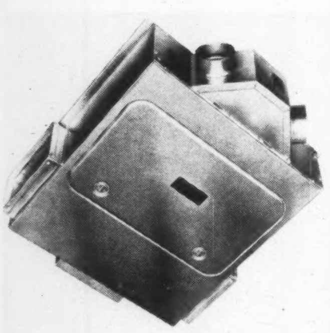
. . . for air conditioning—*Standard Stamping & Perforating Co., Dept. HPAC, 3131 W. 49th Pl., Chicago 32.*

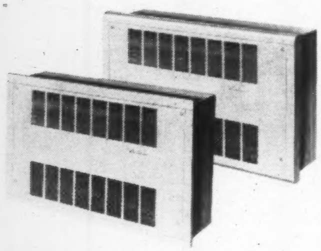
Registers have two banks of adjustable face bars designed to provide even, gentle air distribution, company says. Grilles have fixed bars, which may be preset for either straight flow or downward deflection. Heavy gage steel construction used throughout.

Air Mixing Unit . . .

. . . for dual-duct high velocity systems, designed for general purpose installation — *Buensod-Stacey, Inc., Dept. HPAC, 50 E. 52nd St., New York.*

Recommended by company for overhead distribution of air through standard diffusers, grilles, other types of outlets. All aluminum unit available in five sizes with capacities 70 to 800 cfm. Lightness in weight is principal feature, says company.





Cabinet Units . . .

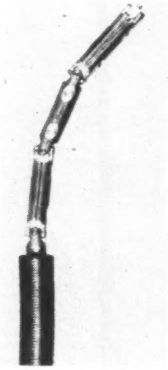
. . . designed for quick installation—*Modine Mfg. Co., Dept. HPAC, Racine, Wis.*

Units can be installed in wall, ceiling, inverted, fully recessed, or partially recessed to various depths. Front panel fabricated from 14 gage steel. Stamped inlet, outlet grilles part of panel; front easily detachable, permits easy removal for maintenance, servicing without distributing wall or paint seal, company says. Capacities range 120 to 640 EDR, designed for high capacity heating with steam, hot water.

Oil Burners . . .

. . . designed for installation in public buildings, commercial establishments—*Carlin Co., Dept. HPAC, Wethersfield, Conn.*

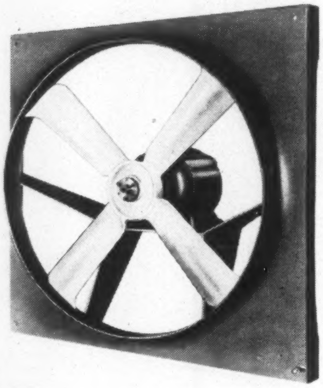
Units have firing ranges 3.00 to 4.50 gph, 3.50 to 7.00 gph, 3.50 to 6.50 gph. Models "500S-35" and "700S-35" feature "Shell Head"; model "650" has standard combustion head.



Link Shaft . . .

. . . with equal torque in both directions — *Clark Flexible Link Shaft Co., Dept. HPAC, Box 73, Newton Highlands 61, Mass.*

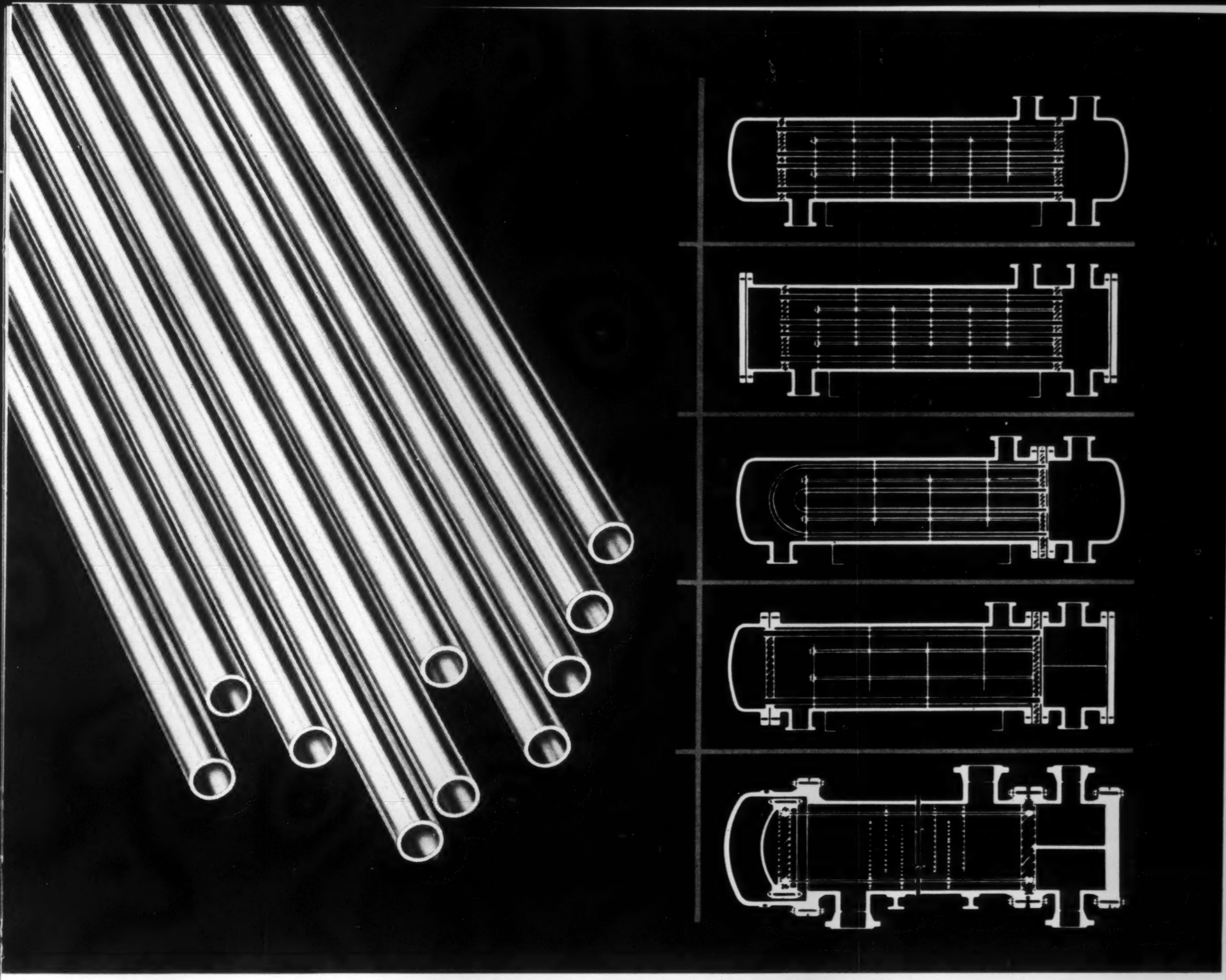
Unit has unlimited length, equal flexibility in all sizes ⅜ in. to 3 in. diameters, says company. Links consist of trunnion blocks, two half links fastened together with screws or rivets. Recommended by manufacturer for use with pumps, compressors, mixers, vibrators, grinders, compressors, etc. Used for hard to reach hand valves, emergency hand valves when power fails, company says.



Fans . . .

. . . for low static pressure ranges — *Aerovent Fan Co., Dept. HPAC, Piqua, Ohio.*

Available in ring, square panel, duct types, sizes 24 to 48 in. diameter. All have four blade "Macheta"



Here's How to Check Corrosion, Prevent Product Contamination

When you have problems of corrosion and product contamination in your heat exchangers and condensers, then it's time to specify B&W Tubing. In an extensive range of processes where these points are key factors, the selection of the best tube steel analysis for the best performance is, in every case, your first requirement.

Because B&W Heat Exchanger and Condenser Tubing is made in a wide variety of carbon, alloy, and stainless steel grades, seamless or welded, and in a full range of combinations of diameters and wall thicknesses to meet practically every requirement, you can select the most economical and dependable tubing for your specific application. Designers prefer B&W Tubing and shop men know from on-the-job experience that it's easy to bend, to roll-in, and to weld.

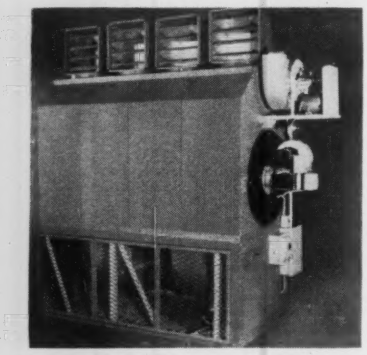
Call on Mr. Tubes at your nearby B&W Tubular Products Division District Sales Office—let him help you solve your heat exchanger or condenser tube problems. Write for bulletin 329. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

B&W
TUBULAR PRODUCTS DIVISION

TA-7006-PG3

Seamless and welded tubular products, seamless welding fittings and forged steel flanges — in carbon, alloy and stainless steels

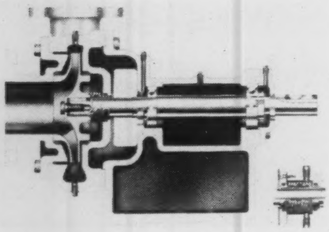
airfoil propellers. Come with special duty motors, protective coatings for unusual moisture, temperature, corrosive conditions, says company.



Heaters . . .

. . . with 2000 F chrome nickel steel combustion chamber—*Johnson Heater Corp., Dept. HPAC, 1 Winnisimmet St., Chelsea, Mass.*

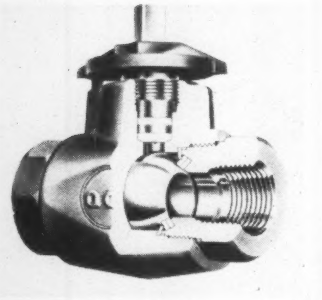
"Model FA Aire-Master" has bonnet output based on 3000 to 3500 Btu per hr heat transfer per sq ft of heating surface. Heater casing is panel type with baked enamel finish. Unit has multiple centrifugal type blower assembly, electronic type safety controls.



Centrifugal Pumps . . .

. . . for general water service — *Gardner-Denver Co., Dept. HPAC, Quincy, Ill.*

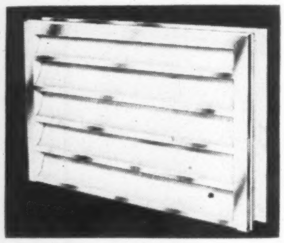
Available in four sizes 1 to 3 in. with capacities 150 to 520 gpm. Features cited: stainless steel shafts, oil lubricated heavy duty ball bearings, mechanical seals, accurately contoured casings, hydraulically balanced bronze impellers. Units perform at high efficiency over wide range of service conditions, company says.



Plug Valve . . .

. . . for use in widely diverse industries including chemical plants, high octane fuel blending installations, off-shore crude oil manifolds — *W-K-M Mfg. Co., Div. of ACF Industries, Inc., Dept. HPAC, Box 2117, Houston.*

Unit is nonlubricated, ball type; has leakproof two-way seal with round, full pipe area. Features cited: quarter turn opening, closing; fully protected seating surfaces; chrome plated ball for extra resistance to wear, corrosion; minimum number of parts.



Louvers . . .

. . . featuring "S" shaped blade — *Titus Mfg. Corp., Dept. HPAC, Waterloo, Iowa.*

New design allows greater free area, company says. May be used in any exterior wall opening where continuous flow of supply or exhaust air is desired. Manufactured of extruded aluminum sections.

Jacket Grippers . . .

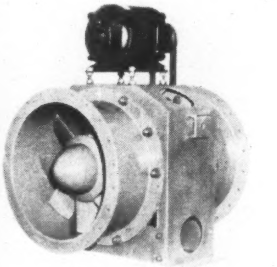
. . . designed to eliminate jacket slippage on welding cable caused by operator tug and pull—*Tweco Products, Inc., Dept. HPAC, Boston at Mosley, Wichita 1, Kan.*

Steel bands internally bind cable strands, cable jacket into strong, composite section, company says. Made in four sizes.

Air Cleaner . . .

. . . designed for increased air volume capacity at high cleaning efficiencies—*Trion, Inc., Dept. HPAC, McKees Rocks, Pa.*

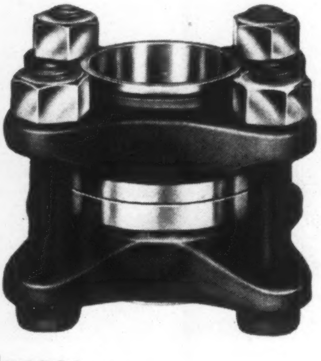
"HCC" electronic unit will clean 350 to 600 cfm of air per sq ft of gross face area at efficiencies from 97 to 85 percent, company says. Equipped with motorized moving cold water washer, adhesive applicator.



Fans . . .

. . . for industrial corrosion exhaust systems — *Industrial Plastic Fabricators, Inc., Dept. HPAC, Endicott St., Norwood, Mass.*

Units have semi-pressure type wheel, air foil type blades, sealed inner housing of PVC welded construction protecting belts and pulleys from corrosive air. Teflon packing gland with stainless steel drive shaft, ball bearing main drive including extension for lubrication are among features cited.



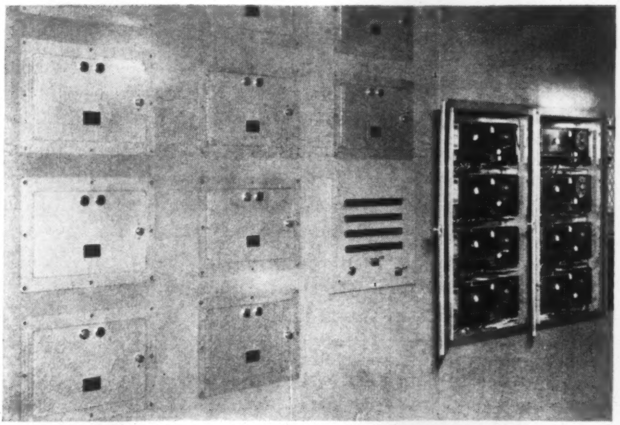
Flanges . . .

. . . in wide range of sizes — *Dersch, Gesswein & Neuert, Inc., Dept. HPAC, 4849 W. Grand Ave., Chicago 39.*

Self aligning deep socket permits

LAKE MEADOWS, Chicago, New York Life Insurance Company's fashionable community overlooking Lake Michigan. Architects and Engineers: Skidmore, Owings and Merrill; General Contractor: Turner Construction Company and S. N. Nielsen Company; Mechanical Contractors: The M. J. Corboy Corporation, Chicago and the Economy Plumbing and Heating Company, Inc., Chicago.

illinois High Vacuum Zone Control System Increases Comfort, Cuts Fuel Costs Here!



NERVE CENTER. This Illinois electronic control panel located in the boiler room is the control center for all buildings.

Chicago's Lake Meadows Project is one of the most modern, most functionally beautiful apartment areas in America. Down to the last detail, this nine-building project was designed for comfort.

Illinois Engineering Company heating products were selected in this "design for comfort". A complete electronic zone control heating system including traps, valves, electronic zone controls and high vacuum pumps was furnished by Illinois. The system automatically provides steam at the optimum pressure and temperature for maximum comfort and economy.

If you also have requirements for an automatic heating system that *increases comfort* and *decreases* fuel costs, call your local Illinois Engineering representative, or contact us directly for complete information.

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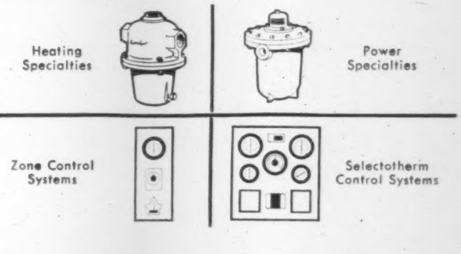


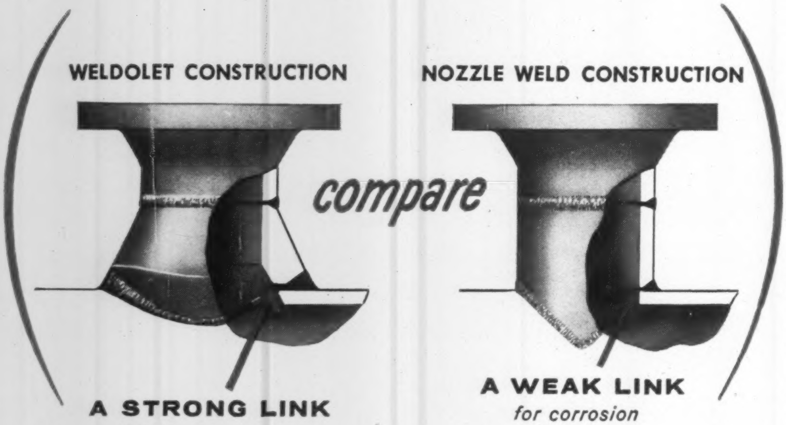
years to your piping

gallons to your flow

strength to an otherwise weak link

add → **BONNEY WELDOLETS**

to your piping drawings for all branch connections



A STRONG LINK
adds years
gallons
strength
and assures a clean, properly fabricated and properly designed branch connection

A WEAK LINK
for corrosion
external forces
internal pressure

Labor costs are now at an all time high. Reevaluation of your piping costs will now reveal Weldolets 4″ and smaller to be less costly to fabricate than unreinforced nozzle connections. In the field this is also true of larger sizes and Weldolets are always more economical than branch connections made by welding tees or reinforced nozzles. Weldolets are manufactured in all sizes from 36″ and all weights from xxs, in carbon steel, stainless, alloy, wrought iron and non-ferrous metals.

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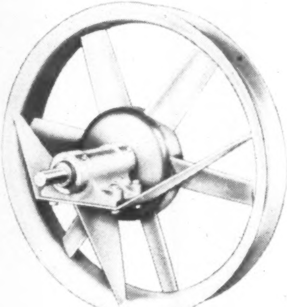
DEPT. C

EQUIPMENT DEVELOPMENTS

Continued

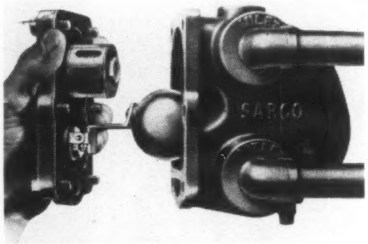
quick, easy installation without costly precision cutting, beveling of pipe, company says. Offered in sizes $1/4$ to 12 in. inclusive. Features cited: compactness, shock resistance, high strength with tongue and groove construction.



Ring Fan . . .

. . . designed for operations using diesel, gasoline, steam, electric motors—*Chicago Blower Corp., Dept. HPAC, 9863 Pacific Ave., Franklin Park, Ill.*

Type "PD" incorporates oversized shaft to accommodate maximum horsepower; suitable for v-belt or flat belt pulley operations. By changing pulley diameters, unit may be adapted to drying, cooling of special equipment, exhausting of various acids. Aerodynamic blade design produces high pressure air pattern without dead spots, company says. Produced in 10 sizes 12 to 72 in.



Steam Trap . . .

. . . designed to provide condensate seal, prevent loss of steam — *Sarco Co., Inc., Dept. HPAC, 350 Fifth Ave., New York 1.*

See your wholesaler for
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a complete line for your every need!

genetron 11—ORANGE LABEL TRICHLOROMONOFLUOROMETHANE	For industrial and commercial refrigeration and air conditioning systems using single or multi-stage centrifugal compressors. Can also be used for either direct or indirect expansion-type systems.
genetron 12—WHITE LABEL DICHLORODIFLUOROMETHANE **genetron 22**—GREEN LABEL MONOCHLORODIFLUOROMETHANE	Used in virtually all types of refrigeration and air conditioning equipment, large and small, household and industrial, direct and indirect expansion systems. Typical units in which "Genetron" 12 and 22 are used: refrigerators, freezers, frozen food lockers, window air conditioners, home or office console units, large custom-built units for commercial comfort or industrial processes, large store units, mobile units for transportation equipment, large home units for addition to present hot air heating systems.
genetron 113—PURPLE LABEL TRICHLOROTRIFLUOROETHANE	Used in 50-ton and larger centrifugal compressors, primarily for large comfort cooling systems, brine cooling systems, and other commercial and industrial air conditioning and refrigeration systems.
genetron 114A—BLUE LABEL DICHLOROTETRAFLUOROETHANE	Used in centrifugal and rotary compressors for commercial, industrial and household refrigeration.

QUICK FACTS on genetron super-dry refrigerants

- Guaranteed exceptionally low moisture content
- Non-corrosive to standard equipment materials
- Non-toxic, non-flammable, stable, safe
- Critical and freezing points well outside range of operating uses
- Solvent action on oil helps prevent solidification or congealing of lubricant
- Freely interchangeable and may be mixed in any proportions with comparable fluorinated hydrocarbons meeting the same strict refrigerant specifications
- Aid in lubrication of equipment; generally miscible with oil
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genetron department

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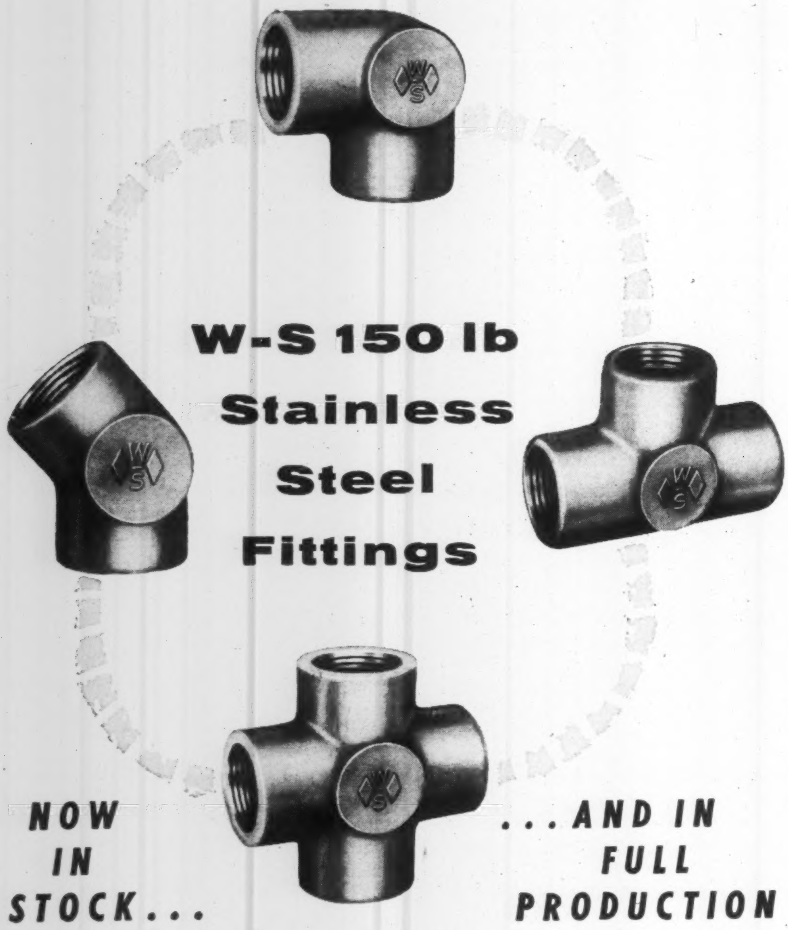

W-S 150 lb Stainless Steel Fittings

NOW IN STOCK... ...AND IN FULL PRODUCTION

New production machinery and techniques developed at W-S Fittings Division now assure you of prompt deliveries on corrosion resistant stainless steel pipe fittings. Your local W-S stainless steel distributor will be glad to fill your order from his stock.

W-S 150 lb stainless steel fittings, types 304 and 316, resist a wide variety of corrosive services in petroleum, chemical, petrochemical, food and other process industries. They are also ideal for many low temperature operations because of their inherent toughness at sub-zero conditions. W-S 150 lb fittings can be obtained in sizes ⅛" to 4" in either screw-end or socket-welding types to meet your needs.

For detailed technical information on our 150 lb line, send today for Bulletin S-3-55. For prompt price and delivery information call your nearest W-S distributor.

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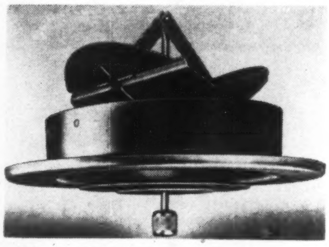
W-S FITTINGS DIVISION

WATSON-STILLMAN

EQUIPMENT DEVELOPMENTS

Continued

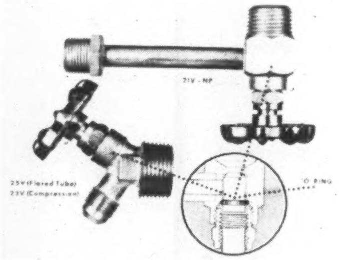
Entire operating element of new "FT" trap is one unit which can be removed without disturbing inlet, outlet connection to semi-steel trap body. Trap discharges condensate at steam temperature continuously, without shock, company says. Recommended by manufacturer to drip steam mains, unit heaters, blast coils, heat exchangers requiring accurate temperature control.



Ceiling Diffusers . . .

. . . available in 6 to 14 in. diameters, with 360 deg diffusion air patterns — *Krueger Air Conditioning Corp., Dept. HPAC, 19 E. Rillito, Tucson, Ariz.*

Unit has friction-controlled butterfly damper with two leaves operated by pushing or pulling central control shaft. Leaf spring exerts constant tension against shaft to maintain friction control of adjustment in all positions, company says. Shaft has knurled handle giving 90 deg control of damper.



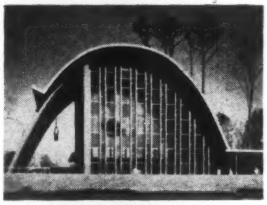
Shutoff Valves . . .

. . . designed for fuel oil service—*Anderson Brass Co., Dept. HPAC, 100 S. Campbell Ave., Detroit 9.*

Units feature "AN" size o-ring seal made from "Buna N" synthetic rubber compound. Can be adapted

Specify RECO

Skilled RECO craftsman seals head of cement-lined storage heater for Jamestown Festival.



VIRGINIA'S JAMESTOWN FESTIVAL

Architects & Engrs.—Ballou & Justice, Richmond, Va.

Plumbing Contr.—Service Plumbing and Heating Co. Williamsburg, Va.

General Contractor—John W. Daniels, Danville, Va.

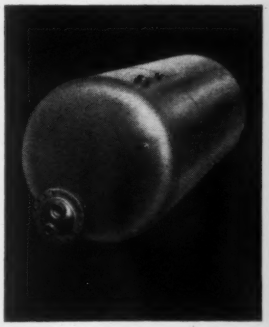
Heating & Plumbing Jobber—Noland Co., Inc. Newport News, Va.

RECO Makes Hot Water History at Virginia's Jamestown Festival

More than two million visitors will walk back 350 years through history at the Jamestown Festival celebration of 1957. But they'll never be more than a few steps away from the comforts of today. A RECO cement-lined hot water storage heater keeps plenty of piping hot water always on tap in the festival's group of administrative buildings—the Reception Center, Gift Shops, Restrooms, and Mermaid Tavern. For these same buildings, a RECO convertor supplies hot water for the forced circulation, modular type heating system.

For guaranteed quality, fair price and quick delivery on *your* next heating job—SPECIFY RECO.

Write for free catalogs and name of RECO representative nearest you today: RECO, Dept. P, 7th & Hospital Sts., Richmond 5, Va.



RICHMOND ENGINEERING CO., INC.

CONFESSIONS OF A
HEATING CONTRACTOR

Built-up boilers used to bog me down in a pile of parts. Fuss and cuss all the time! Assembly — what a headache! Completing a manufacturer's job on my time, on my own money.

Then happy day! I discovered Progress —Progress packaged boiler, I mean. No more bogging down with built-up boilers. One source ... one responsibility. A complete, ready-to-operate boiler delivered to the job. Saves up to two full days' installation time. Progress boilers are full-fire factory tested. Field starting service costs me nothing and my customers are 100% satisfied.

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To make progress . . .
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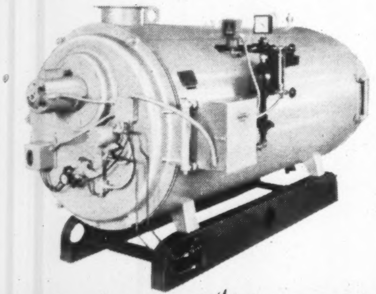
Heating wholesalers coast to coast are now delivering 7 sizes to 2,010,000 Btu. This complete range covers *all types* of commercial heating needs. Oil, gas and combination oil/gas fired models for greatest fuel economy. To make profits and progress in your business — sell Progress — America's leading boiler-value!

See your nearest qualified cooperative wholesaler NOW, or write:
CLEAVER-BROOKS COMPANY
Dept. L, 313 E. Keefe Ave.,
Milwaukee 12, Wisconsin



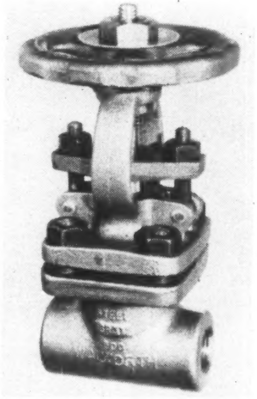
Cleaver-Brooks
Progress
Packaged Boiler

Cleaver Brooks

Built exclusively for commercial heating by Cleaver-Brooks — originators of self-contained boilers.

EQUIPMENT DEVELOPMENTS
Continued

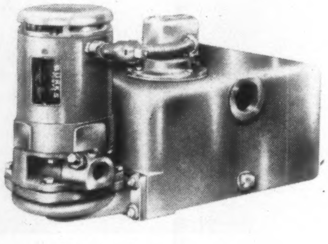
to pressure rating of 500 psi. Units do not require backseating, tightening of packing nut to eliminate stem leakage in open position, company says.



Steel Wedge Gate Valve

. . . for water, steam, gas, air service at temperatures to 850 F, oil or oil vapor to 1000 F — *Walworth Co., Dept. HPAC, 60 E. 42nd St., New York.*

Unit is 600 lb, has nonshock pressure-temperature rating of 420 psi at 1000 F, and rating of 2000 psi at 100 F. Available with screwed or socket welding ends. Those with union bonnets in eight sizes 1/4 to 2 in.; with bolted bonnets in six sizes 1/2 to 2 in. All units are of outside screw and yoke design; are said to permit repacking under pressure when fully opened.

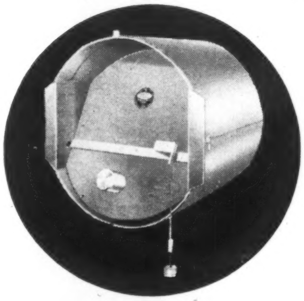


Centrifugal Pumps . . .

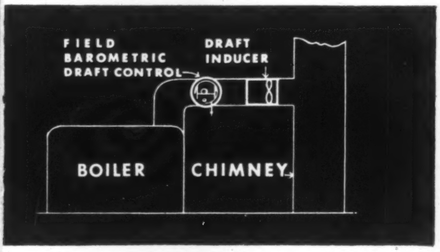
. . . for use with condensate systems in capacities to 12,000 sq ft of radiation, to 20 psi operating pressure — *Decatur Pump Co., Dept. HPAC, Decatur, Ill.*

FIELD BAROMETRIC DRAFT CONTROLS

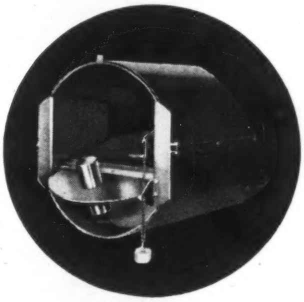
increase the efficiency of induced-draft installations



FIELD TYPE "M" Barometric Draft Control for coal or oil, sizes up to 32".



Field Barometric Draft Control installed in connection with a draft inducer prevents fuel waste caused by wide variations in draft.



FIELD TYPE "MG" Barometric Draft Control for gas or oil-gas, sizes up to 32".

When a draft inducer is used, to assist a faulty chimney, or to permit modern, low-stack construction, a Field Barometric Draft Control should also be installed. In such an installation, the inducer can be set to meet maximum, "high-fire" draft needs without risk of excessive draft. Whenever the draft requirement is less than the draft inducer setting, the Field Control automatically reduces the draft. Here is why the Field Draft Control can make an important contribution to efficiency at all firing rates:

1 - During "off-fire" periods, even the *natural* draft present may be excessive. Field reduces the draft, prevents rapid cooling of the boiler.

2 - During "low-fire" periods, the artificially induced draft may be greater than needed to vent a relatively small volume of gases. Field regulation prevents the loss of high temperature gases.

3 - During "high-fire" periods the Field Control compensates for continuously variable factors affecting draft. For example:

Changes in line voltage, affecting blower speed, change the volume of gases handled and thereby affect the draft.

Changes in resistance caused by the accumulation of fly ash or soot in boiler and breeching cause changes in the draft needed.

Changes in wind and outside temperature, affecting natural draft, cause variations in the artificial draft needed.

Where a number of boilers are discharging into a common stack, the need for draft will vary as firing rates vary. Draft required with all boilers on "high-fire" may be excessive when one or more boilers cut out.

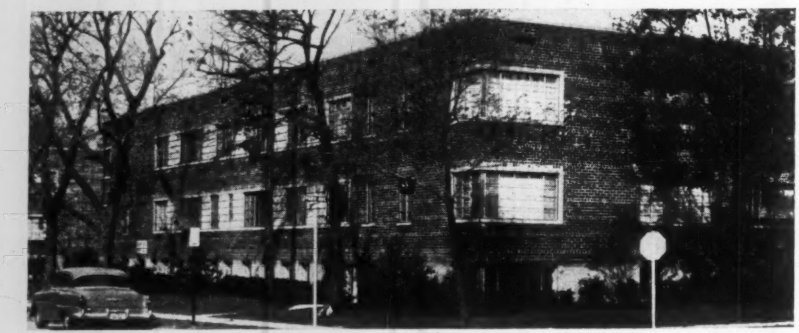
A Field Barometric Draft Control, sensitive to the slightest change in pressure, corrects for any variation, holding draft to the required setting. Write us for technical data. Field Draft Controls are available in sizes up to 32 inches for oil, gas, coal and oil-gas installations.

field

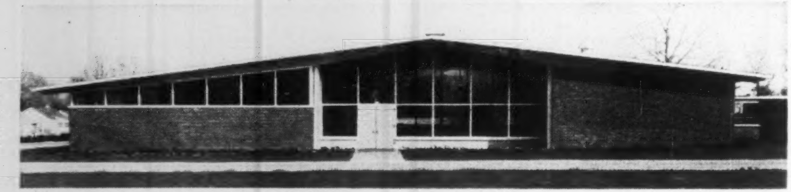
FIELD CONTROL DIVISION
of H. D. Conkey & Company, Mendota, Illinois

AFFILIATES:
Conco Building Products, Inc. • Brick, Tile, Stone — Conco Materials Handling Div. • Cranes, Hoists

Represented in Canada by Ontor Limited, 12 Leswyn Road Toronto 10, Ont., Canada



(Above) Suburban Apartment House using Wing Draft Inducers



(Above) Modern school using Wing Draft Inducer

(Below) Industrial Plant equipped with Wing Draft Inducers

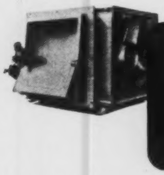
Look! — **no chimneys**

MODERN buildings are now being designed without tall obtrusive chimneys marring their clean horizontal lines. This refreshing trend is made possible by the use of Wing Draft Inducers in the boiler or furnace room, eliminating the necessity for stack or chimney.

But that is only one of the advantages of Wing Draft Inducers. Another is the substitution of positive, uniform, adequate draft at all times, regardless of wind, weather or load variations.

Savings through these advantages are impressive. Write for a copy of Bulletin I-57 and see for yourself.

L. J. Wing Mfg. Co. 140 Vreeland Mills Road · Linden · N. J.
DIVISION OF AERO SUPPLY MFG. CO. INC.



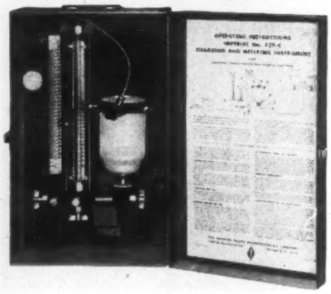
Wing
DRAFT INDUCERS

FANS • UNIT HEATERS • DRAFT INDUCERS • BLOWERS • TURBINES

EQUIPMENT DEVELOPMENTS

Continued

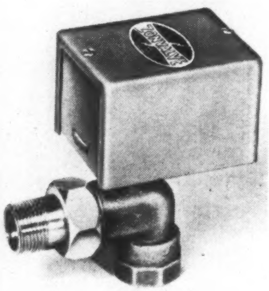
Pumping parts made of noncorrosive bronze. Units equipped with mechanical shaft seals said to be drip free. Units will not steam bind because of positive head on suction, company says. Both single pump, duplex models utilize two pipe connections for operation, are fully automatic.



Metering Instrument . . .

. . . for servicing capillary controlled, hermetically sealed refrigeration systems—*Imperial Brass Mfg. Co., Dept. HPAC,* 1200 *W. Harrison St., Chicago* 7.

Unit measures small quantities of dry refrigerant, assures exact charging, company says. Calibrated for both fluorinated hydrocarbon refrigerants 12 and 22 in either 15.2 oz cans, or 32 oz cans of F-22. Designed for operation without removal from case.

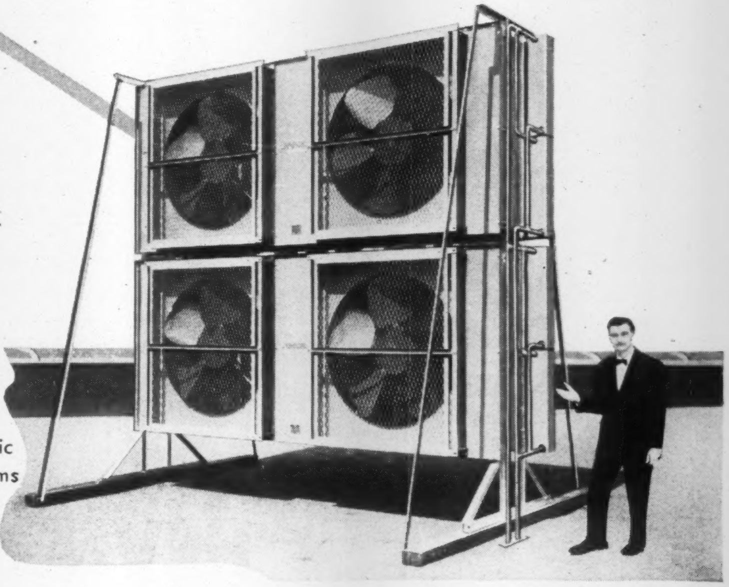


Valve . . .

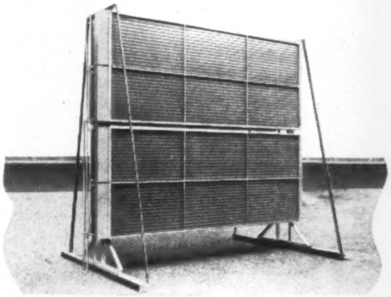
. . . with thermostatically controlled operation — *Heat-Timer Corp., Dept. HPAC,* 657 *Broadway, New York* 12.

For installation on room radiators or supply piping for each zone. Powered by electric motor, requires no

KRAMER
UNICON
GETS BIGGER and BIGGER



There is only one answer to large capacity condenser problems — the KRAMER UNICON. Every day more engineers plan larger tonnage installations — 50, 100 and even — 800 tons. And every day UNICONS are shipped to all parts of the world for giant-sized installations. No other air-cooled condenser can match the long, successful record of UNICON, backed by thousands of applications since 1937 — in the widest range of tonnages and climatic conditions. Your condensing problems can be best answered by use of the best — the KRAMER UNICON.



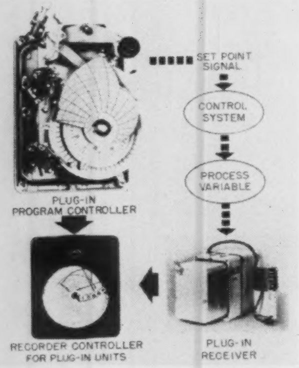
Space-saver UNICON, *as illustrated,* serves a 60-Ton air conditioning system, yet takes but 70 sq. ft. of roof space.

UNICON is a remote-type air-cooled condenser that requires no water. KRAMER UNICON can be used with any size compressor, REGARDLESS of horsepower. Any size refrigeration or air conditioning system can be air-cooled with UNICON, REGARDLESS of tonnage. UNICON requires less horsepower, less piping, is easier to install and costs less. KRAMER UNICON performs best — even in semi-tropical climates.

WRITE FOR BULLETIN U-210D

KRAMER TRENTON CO. • Trenton 5, N.J.

skilled electrical work since it uses low voltage wire, company says. When in open position, valve automatically turns on burner or circulator.


SET POINT SIGNAL
CONTROL SYSTEM
PROCESS VARIABLE
PLUG-IN PROGRAM CONTROLLER
RECORDER CONTROLLER FOR PLUG-IN UNITS
PLUG-IN RECEIVER

Program Controller . . .

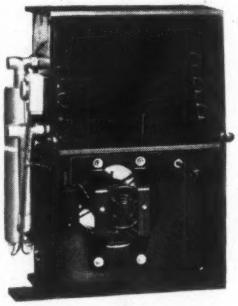
. . . designed to simplify industrial process automation by receiving, recording, programming process variables within single recorder case — *Bailey Meter Co., Dept. HPAC, 1050 Ivanhoe Rd., Cleveland 10.*

Set-point signal for controlling process variable is produced in accordance with shape of 6 in. diameter aluminum, chart-printed cam. During programming cycle, one or two precision, snap-action switches for external functions may be operated at specified points as often as desired, company says. Operates on 115 volts; 25, 50, or 60 cycles per sec.

Pipe Joint Compound . . .

. . . with new "antiskinning" ingredient formulated to prevent skin formation during application or while in container—*Federal Process Co., Dept. HPAC, 1120 Citizens Bldg., Cleveland 14.*

Compound can now be exposed to air in open containers with little or no tendency to skin formation during normal exposure, company says. Seals threaded connections, face joints, seams, gaskets, etc.



Heating, Cooling System . .

. . . with electrical operation, circulating water — *Electric Heating and Cooling, Inc., Dept. HPAC, 890-898 Broadway, Newark 4, N. J.*

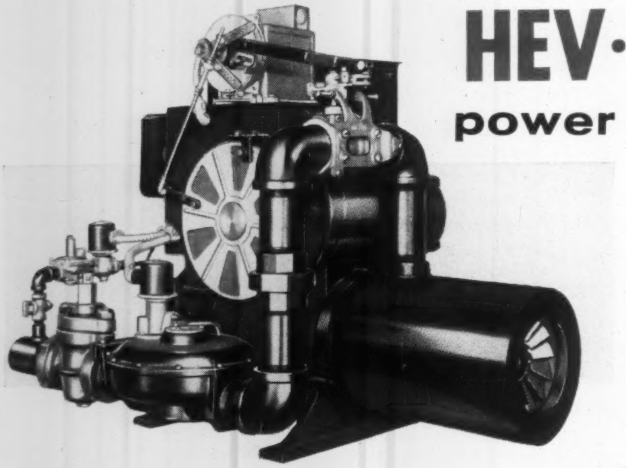
Feature cited is electric "Percojet Heat Pump" which contains no moving parts. Individual room comfort provided winter, summer without affecting conditions in adjoining rooms or area, company says. Maximum heating capacity of each single unit in system rated to 11,400 Btu per hr at 175 cfm with entering air at 70 F and circulation of 2 gal per min of 180 F water through system. Available for 115 or 230 volts a-c.

Sure-fire ways to bag 4 "birds" who buy gas commercial heating

Yours with only

HEV·E·DUTY

power gas burners



The Combustion Efficiency Hawk

This bird's easy because HEV-E-Duty power gas burners operate at peak combustion efficiency under *all* conditions — weather, location, type of boiler, type and size of stack. Gas is burned entirely in suspension with perfectly controlled, quiet flame.

The CO Quail

HEV-E-Duty power gas burners automatically maintain correct air-to-fuel mixture which results in combustion with high CO_2 . . . NO CARBON MONOXIDE. Operate equally well when burning oil as a steady standby measure.

The Gadget-Seeking Grouse

Quality-built, superbly engineered HEV-E-Duty power gas burners are equipped with the finest and most modern gas controls and *electronic* flame failure safeguards.

The Thrifty-Minded Road Runner

Whatever this bird has in mind, he'll find it in the competitively priced line of 26 models including straight gas, combination light oil and gas, combination heavy oil and gas.

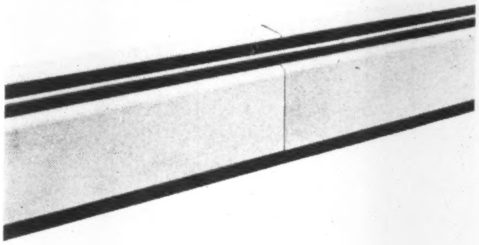
Write today for details on select dealer franchises still available.

Cleaver-Brooks Company
Burner Division

Dept. L, 392 East Keefe Avenue, Milwaukee 12, Wisconsin

EQUIPMENT DEVELOPMENTS

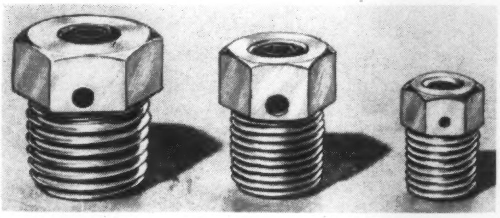
Continued



Baseboard . . .

. . . with new element—*Continental Mfg. Co., Dept. HPAC, Box 4048, Baltimore 22.*

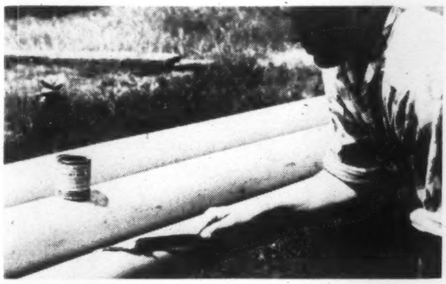
"Beautybase H-20" has rectangular aluminum fins which allow 3/4 in. copper tube to expand, contract noiselessly, company says. Installation features include: brackets that can be located wherever desired by snapping into place, "snap on" accessories, telescoping splice pieces.



Valves . . .

. . . designed for variety of uses—*Hydrovalve Co., Dept. HPAC, Brooklyn 3.*

Used in refrigeration as level test cock, purge plug; on oil burner fuel units as quick air vent; hydraulic cylinders, pumps. Made of brass with needle type alloy socket screw for use with regular hex wrench. Available in 1/4, 1/8, 1/16 in. dry seal pipe thread.

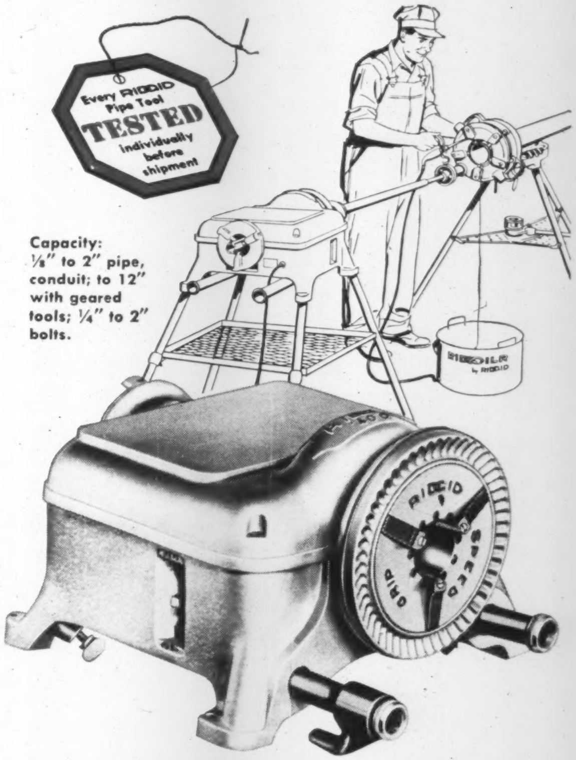


Emergency Repair Kit . . .

. . . for tanks, pipes, pumps, valves, etc.—*Devcon Corp., Dept. HPAC, Endicott St., Danvers, Mass.*

Contains 1 lb "Plastic Steel," jar of hardening agent, jar of release agent, special rubber covered

You can't afford to cut, ream and thread pipe by hand!



Capacity: 1/8" to 2" pipe, conduit; to 12" with geared tools; 1/4" to 2" bolts.

RIDGID 400A

powers your hand tools . . . saves you time and work!

Your job is so much easier, faster when this stout little power drive turns pipe, conduit, rod for your hand tools. Easy hand-action Speed Chuck holds tight forward or reverse. Full of RIDGID features that give you far the most time and work saving for your money—see it, try it at your Supply House.

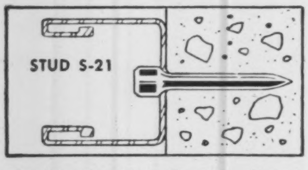
The Ridge Tool Company, Elyria, Ohio, U. S. A.

RIDGID
Work-Saver Pipe Tools

Just one of 101 Stud Driver uses!

No outside power source required—

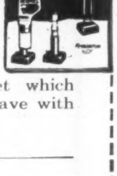
Anchor flexible framing section to concrete or steel in seconds with the Remington Stud Driver



Flexible Framing Section Guard fits snugly over work, assures accurate placement of stud. 22 caliber Power Load drives Remington S-21 Stud in place . . . permanently, arrow straight!

You can easily anchor metal section to concrete without laborious hammering or drilling! Just squeeze the trigger, and the Stud Driver sets a 1/4" or 3/8" diameter metal stud . . . up to *six* a minute, either size. Barrel changeover takes only 90 seconds, *right on the job!* Over 40 Remington Studs to choose from, plus scientifically graded Power Loads that furnish *exact* driving force for toughest jobs. Take the tool anywhere, use it anywhere for light, medium or heavy-duty fastening.

FREE BOOKLET shows how you can save with the Stud Driver. Mail the coupon for your copy.



Industrial Sales Division, Dept. HPA-10
Remington Arms Company, Inc.
Bridgeport 2, Conn.

Please send me your free booklet which shows how I can speed the job and save with the Stud Driver.

Name_____ Position_____
Firm_____
Address_____
City_____ State_____

Remington

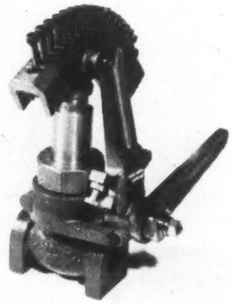
DU PONT

STUD DRIVER

EQUIPMENT DEVELOPMENTS

Continued

steel patch, length of glass tape, measuring spoons, complete directions. "Plastic Steel" is combination 80 percent steel and 20 percent plastic. Laminations of glass tape with combination have compression strength of 50,000 psi, tensile strength of 45,000 psi, company says.



Valves . . .

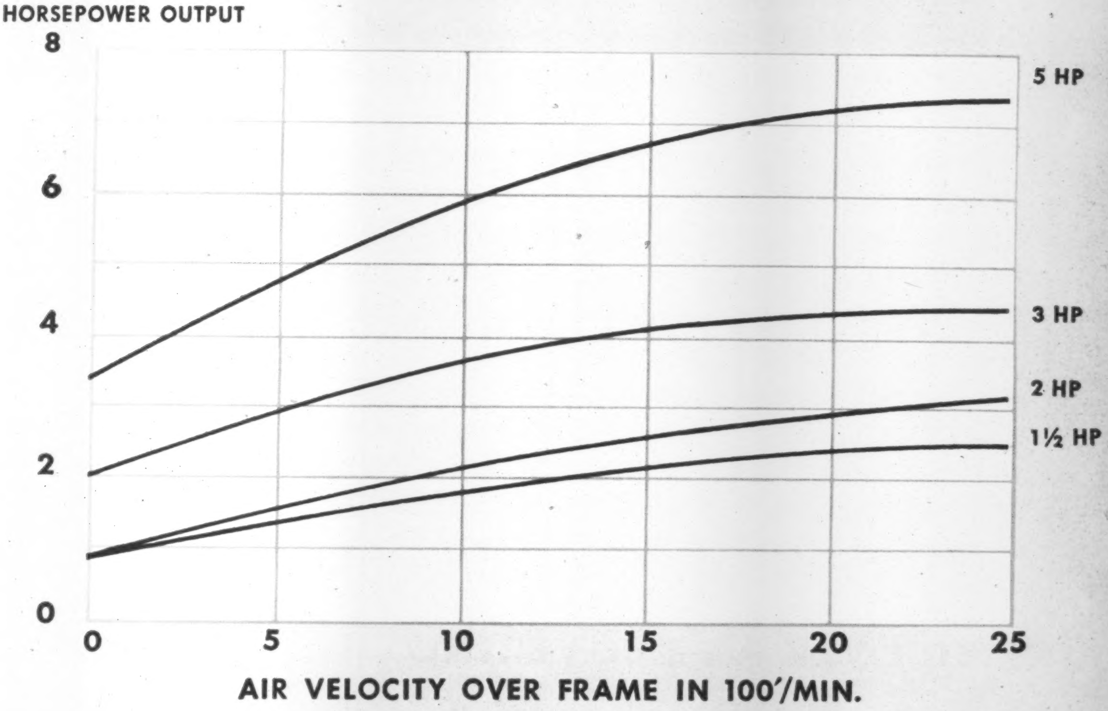
. . . for metering control of fuel oil in industrial oil burner installations — *Atlas Valve Co., Dept. HPAC, 280 South St., Newark 4, N. J.*

"Type 235" designed to control, maintain certain flow ratio between two variables such as air and fuel oil, into oil fired steam boiler. May be used in applications where flow of two fluids must be kept within specified ratios. Valve has flexible sheet metal cam; seats furnished with 3/8 in. diameter bore in single seated valves, as required in double seated valves. Discs with restriction plugs have correct v-port for maximum flow required, says company.

Liquid Detergent . . .

. . . designed for use in solution-lifting steam guns, self generating steam cleaning equipment—*Oakite Products, Inc., Dept. HPAC, 157 Rector St., New York 6.*

"LSD" handles wide variety of steam cleaning operations ranging from light to medium-heavy duty, provides effective soil removal at concentrations of 1 to 2 oz to each gallon of water as delivered by gun, company says. Its solutions have pH of 12 in operating range.



SAVE 15% AND MORE ON FAN MOTORS

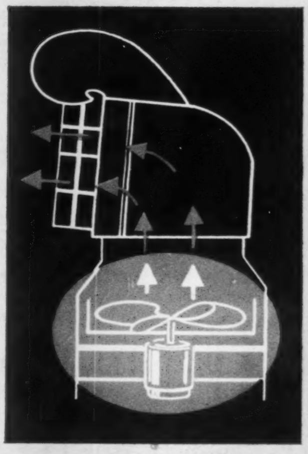
You can get as much as 50% more horsepower at no extra cost by using Reliance Air-Over Motors to drive fans and ventilators.

Reliance has developed a new line of totally-enclosed motors for fan service. These motors produce more horsepower when mounted in the air stream of the driven fan. Reliance Air-Over Motors will develop as much as 50% more than rated horsepower by utilizing the cooling effect of the fan's air flow.

These new Reliance Motors will save you money. By purchasing a lower horsepower rating you can save more than 15% and still meet job specifications.

Reliance Air-Over Motors are available from ½ through 40 horsepower—720, 900, 1200, 1800, or 3600 rpm. Common horsepower ratings are available from stock.

B-1547



RELIANCE R ELECTRIC

AND ENGINEERING COMPANY

DEPT. 3610A, CLEVELAND 17, OHIO • CANADIAN DIVISION: WELLAND, ONTARIO

Sales Offices and Distributors in Principal Cities

The heart of the matter

IS IN THE COVERING

Available in standard pipe sizes and fittings in three thicknesses; Light, (Ice Water to 30° F.) Medium, (Brine and Ammonia to 0° F.) Heavy, (Heavy Brine—25° F. and lower.)

UNITED CORK PIPE COVERING

THE IDEAL COLD LINE INSULATOR

Improper pipe insulation can mean an excessive loss in refrigeration efficiency and dollars to the cold storage operator. It is important to get the right pipe covering insulation that will have all these advantages:

Extremely low "K" factor
Retains over 80% of cold loss on piping
Easy and economical to install
Long trouble-free life
Fire retardant—Vermin resistant
No capillarity

LARGER STOCKS—FASTER DELIVERY—PERSONAL SERVICE

United Pipe Coverings are available from stock for prompt delivery—to fulfill your immediate installation requirements. Mail the coupon below for additional information or the United distributor nearest you.

Corkboard
Pipe Covering
Tank Lagging

UNITED BB CORKBOARD (BLOCK BAKED) Patented

Manufacturers of cork insulation for almost a half century

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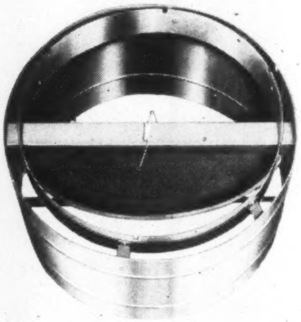
CITY ______________ ZONE ______ STATE ______

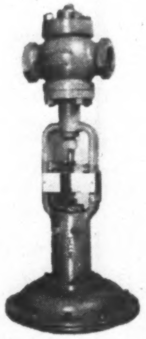
Engineering offices, or approved distributors, in key cities—coast to coast.



Damper Opener . . .

. . . designed as fire safety factor for industrial plants utilizing sprinkler systems—*Chicago Blower Corp., Dept. HPAC, 9863 Pacific Ave., Franklin Park, Ill.*

Unit completely independent of fan operations allows smoke, fumes to escape permitting faster access to area by fire fighters, company says. Uses no electrical devices, wiring, thermostats, counterweights. Excessive heat breaks link which releases spring raising ventilator dampers.



Transducers . . .

. . . for converting valve stem position into indication, record, control signal — *H. E. Sostman & Co., Dept. HPAC, 347 Lincoln Ave., E., Cranford, N. J.*

Output signal from unit may be used with variety of indicators, recorders; may be utilized as feedback signal in servo loop. Company says signal unaffected by distance from valve to readout instrument; auxiliary equipment for pneumatic transmission eliminated; ratio control sys-

Scale removal simplified with acid cleaners

in easy-to-handle **dry** form

Cleaners based on Du Pont Sulfamic Acid are safer, more convenient, non-fuming . . . dissolve in water to form effective, low-corrosive solutions

Now . . . powerful acid cleaners you handle *dry* with no hazardous fumes, no acid splashing! When added to water, these cleaners form solutions equal to hydrochloric acid in penetrating power, yet they're far less corrosive. The key to these unusual properties is Du Pont Sulfamic Acid.

Cleaners based on sulfamic acid cut downtime to a minimum during scale removal. In many situations, because there are no fumes, cleaning can be done with no interference to normal operations. And, because these cleaners are easier to handle and store, their use results in lower labor and storage costs.

We'll gladly send you additional information on sulfamic acid-based cleaners, and the name of formulators who offer these new compounds. Just mail the coupon below.

DU PONT
SULFAMIC ACID

DU PONT
REG. U.S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Dept., Room N-2533
Wilmington 98, Delaware

Please send me ☐ sulfamic acid general equipment cleaning bulletin; ☐ air conditioning bulletin; ☐ names of formulators offering cleaners based on Sulfamic Acid.

*Name*____________________________________

*Company*__________________________________

*Address*__________________________________

*City*__________________ *State*________________

Preferred THERMOPAK

SPECIFICALLY DESIGNED FOR THE HEATING CONTRACTOR

Lower your job costs with this "packaged" combustion system

With the Preferred Thermopak the contractor purchases a complete equipment package—easily and inexpensively installed—for these reasons:

1—This design eliminates internal arches, wing walls and checker work floors, thus eliminating expensive brickwork.

2—The burner and controls are completely wired and the package carries the union label. Just supply power.

3—Preferred's piping and preheating systems simplify piping requirements, thereby effecting further savings.

The Consulting Engineers Approve Thermopaks because they are completely engineered, factory-assembled and tested. One complete package from one manufacturer for completely automatic operation on any fuel at higher than average efficiencies.

The Owner Prefers the Thermopak because it increases boiler life expectancy, reduces brickwork maintenance and reduces fuel costs. Service requirements are simplified.

The Thermopak is available for operation on any fuel or combination of fuels, and for installation with fire-tube or water-tube boilers of 20 to 525 HP.

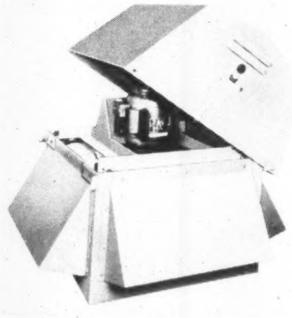
On your next job estimate include this Preferred combustion unit and SAVE. Your inquiry will bring a prompt quotation, dimension drawings and literature.

PREFERRED UTILITIES
MANUFACTURING CORP.
1860 BROADWAY Dept. HP NEW YORK 23, N. Y.

EQUIPMENT DEVELOPMENTS

Continued

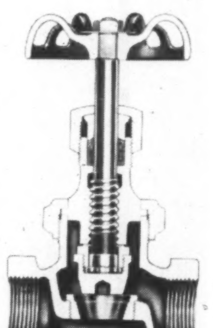
tems possible. Valve stem travels of 0.25 in. and longer can be accommodated. In ranges 0.25 to 1 in., sensitivity is 0.0007 in. In ranges from 1 in. up, sensitivity is 0.001 in.



Roof Ventilator . . .

. . . with various motor selections — *Peerless Electric Co., Dept. HPAC, Warren, Ohio.*

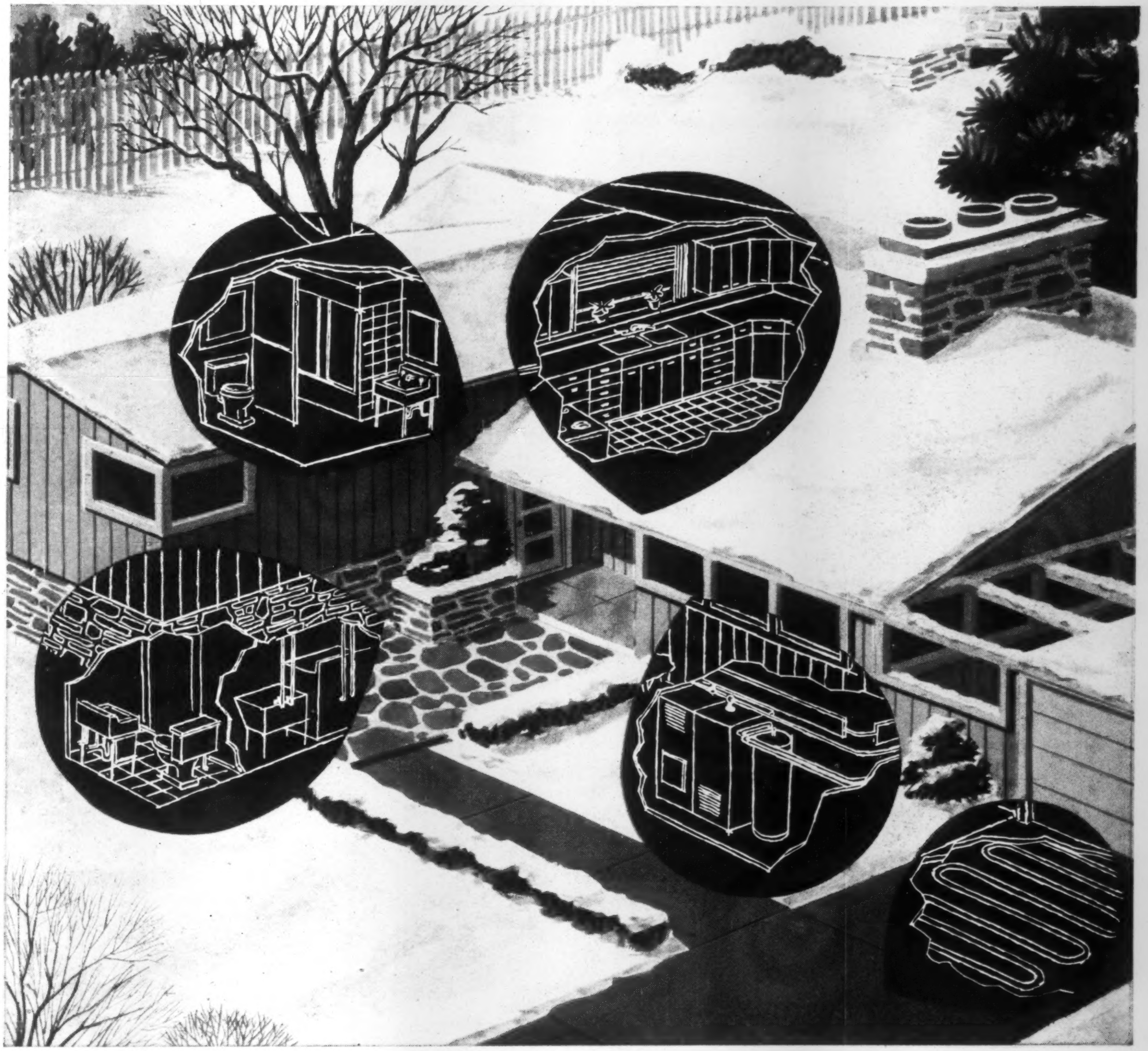
Horsepower sizes range 1/10 to 10. Wheel diameters are $12\frac{1}{4}$ in. to $36\frac{1}{2}$ in. Capacities are 1100 cfm to 25,000 cfm. Backward curved wheels dynamically balanced, taperlocked to shaft. True spun venturi inlet assures quietness, high efficiency, helps unit operate with near centrifugal blower characteristics, company says.



Valves . . .

. . . with hardened stainless steel seats, discs — *Ohio Brass Co., Dept. HPAC, Mansfield, Ohio.*

Units come in both 150 and 200 lb working steam pressure classes. Designed for use where frequent operation causes excessive wear to ordinary materials or where corrosive



STEEL PIPE . . . vital arteries for modern living

Steel pipe is one of the most important metal products in our daily lives. Modern comforts and conveniences in the home depend on pipe. In industrial life, pipe is the arterial system for the lifeblood of power and energy.

Jones & Laughlin is one of the world's principal suppliers of tubular products of highest serviceability. J&L controls *quality* all the way from raw materials through the finishing mills. Whenever you need superior pipe and dependable service, call your nearby J&L distributor. Or write to the Jones & Laughlin Steel Corporation, Dept. 519, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

J L STEEL

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. . . a great name in steel

HOW TO SOLVE THE 3 BIG PROBLEMS of Heating System Design

KEEP COSTS DOWN

The cost of Reznor unit heaters is comparable to or lower than that of other types of equipment of equal heating capacity. And with Reznor, this is the total cost. You don't have to add the costs of extensive piping and valves or duct work, and of radiators or registers. Reznor gas unit heaters produce and distribute heat at the point of need. To install them involves only suspension, venting and utility connections. So installation costs are much lower than those of central heating systems. Lower equipment cost . . . lower installation cost . . . two reasons why Reznor gas unit heaters can offer substantial savings on heating systems for so many commercial and industrial buildings.

SAVE SPACE

Reznor gas unit heaters are installed up at the ceiling, completely out of the way. When you design for a store or factory, you don't have to allot a single square foot of valuable space for heating equipment . . . and you don't have to keep floor or wall areas clear for radiators or registers.

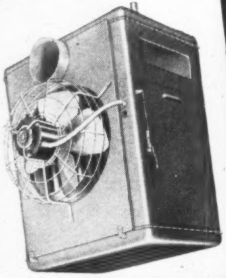
INSURE FLEXIBILITY

When you specify Reznor gas unit heaters you don't have to choose between a heating plant which is over-sized and over-priced for current requirements and one which may not be adequate for future needs. With Reznor unit heating, when that new wing is added, additional heaters are installed. It's as simple as that. And in the case of internal remodeling, it's very easy and inexpensive to relocate the existing heaters.

ONLY REZNOR GAS UNIT HEATERS OFFER ALL THESE ADVANTAGES

- Clean, modern design, back as well as front . . . all controls and connections inside the cabinet.
- FlexiTemp control system with automatic two-speed fan control to provide nearly continuous air circulation and minimize temperature fluctuations (optional).
- No costly frills and gadgets . . . features which are needed only to meet special situations always separately listed and priced.
- Fan or blower models in ten sizes from 25 to 300 thousand BTU.

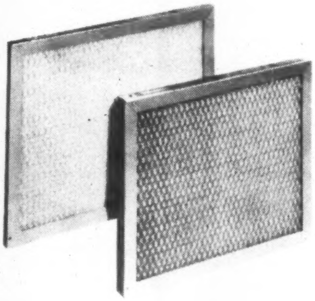
There is no "equivalent" for Reznor gas unit heaters.



REZNOR
WORLD'S LARGEST-SELLING DIRECT-FIRED
UNIT HEATERS
Reznor Manufacturing Company
51 Union St., Mercer, Pennsylvania

for complete details, wherever you are . . .
Look for Reznor under "Heaters-Unit" in the Yellow Pages

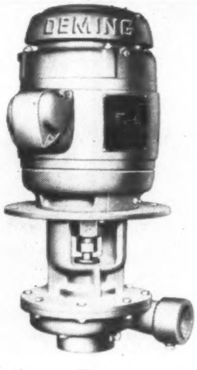
service tends to affect closure surfaces. Recommended by company for close throttling of steam, water, oil, air. Available in eight sizes ½ to 2 in.



Air Filter . . .

. . . made of special plastic filtering material with built-in electrostatic properties — *Skuttle Mfg. Co., Dept. HPAC, Milford, Mich.*

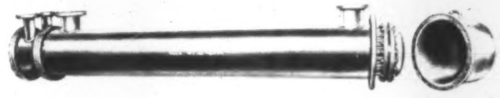
Available in ½, 1 in. thicknesses. Ten standard 1 in. sizes range from 10 in. × 20 in. to 15 in. × 30 in.; 38 standard ½ in. sizes range from 6 in. × 20 in. to 14⅝ in. × 23¼ in. Filter encased in riveted aluminum frame, contains four layers of thermoplastic filtering media placed between expanded metal grilles.



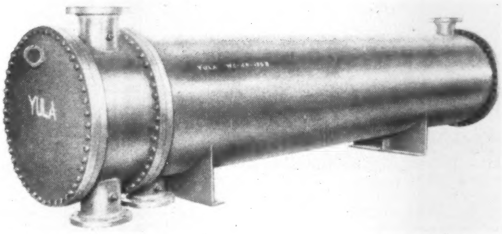
Circulation Pumps . . .

. . . designed for use in air conditioning, cooling, heating circulation systems — *Deming Co., Dept. HPAC, Salem, Ohio.*

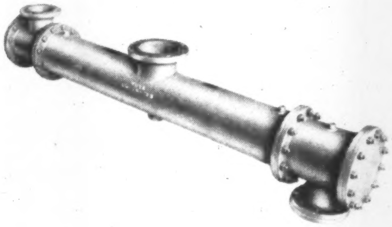
Units are short setting models with ends immersed in pumped liquid. Each pump circulates to 500 gpm against heads to 100 ft. Available in



Full Floating Head Exchanger.



Channel Type Interchanger — for water-to-water application in Air Conditioning.

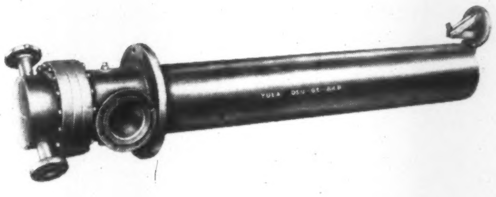


Straight Tube Channel Type Convertor — for Heating, Zone Systems, Snow Melting where either steam or water is the heating medium.

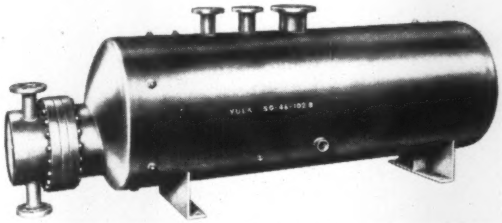
Yula

a complete line of heat transfer equipment for every application

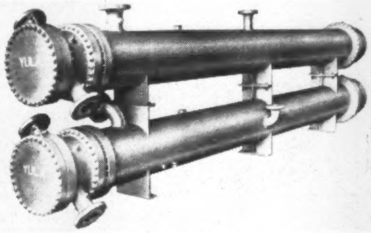
Our organization is experienced in the design and fabrication of heat exchangers for commercial, process, chemical, refinery and marine requirements. In addition, we have made a specialty of the application of High Temperature Hot Water as a heating medium through the use of transfer equipment. We are still old fashioned in one respect; that a satisfied customer is valuable. Because of this belief, we offer; quality, fine workmanship, excellent service, free engineering consultation and fair prices. Our shop is A.S.M.E. certified for materials commonly used in fabrication.



Oil Tank Suction Heater with Check Valve.



Unfired High Temperature Hot Water Steam Generator.



High Pressure Floating Head Oil Heaters — for Power Plant Application.

The

Seagram Building

375 Park Avenue
New York, N. Y.

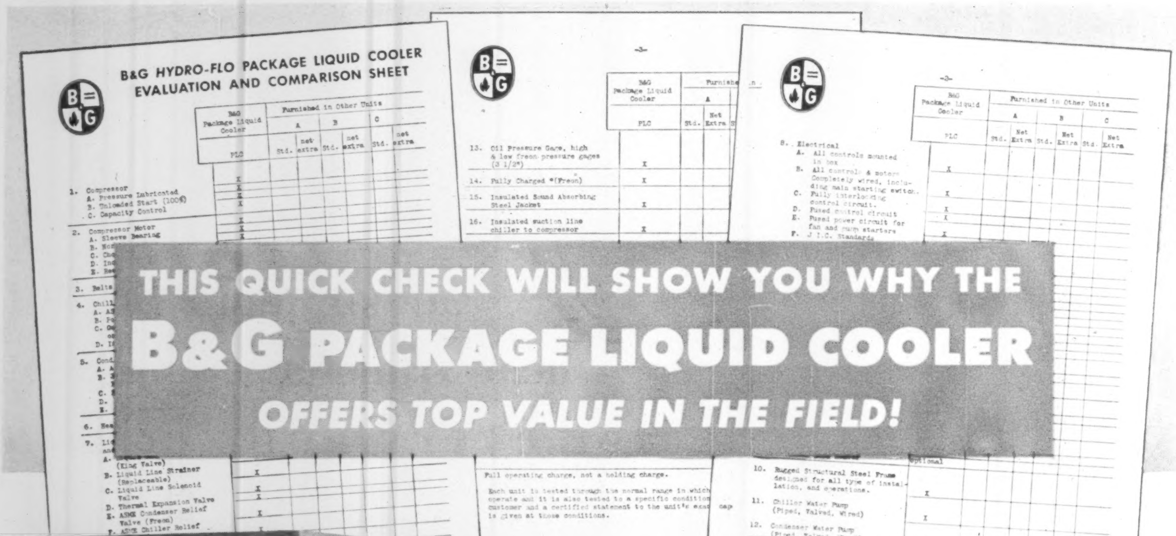
One of the newest and most modern buildings and truly representative of the finer type structures in which YULA products are specified for complete reliability. Architects, Mies vander Rohe and Philip Johnson. Asso. Architects, Kahn & Jacobs. Consulting Engineer, Jaros, Baum & Bolles. Mechanical Contractor, Kerby Saunders. Photo courtesy Copper & Brass Research Association

We will appreciate your inquiry . . . please write today.

YULA WATER HEATERS, INC.

330 BRYANT AVENUE, NEW YORK 59, N.Y.

MEMBER FUEL OIL AND WATER HEATER MANUFACTURERS ASSOCIATION



B&G HYDRO-FLO PACKAGE LIQUID COOLER
EVALUATION AND COMPARISON SHEET

B&G Package Liquid Cooler	Furnished in Other Units					
	A		B		C	
PLC	Std.	net extra	Std.	net extra	Std.	net extra

1. Compressor
   - A. Pressure Lubricated — X
   - B. Unloaded Start (100%) — X
   - C. Capacity Control — X
2. Compressor Motor
   - A. Sleeve Bearing — X

13. Oil Pressure Gage, high & low freon pressure gages (3 1/2") — X
14. Fully Charged *(Freon) — X
15. Insulated Sound Absorbing Steel Jacket — X
16. Insulated suction line chiller to compressor — X

8. Electrical
   - A. All controls mounted in box — X
   - B. All controls & motors Completely wired, including main starting switch. — X
   - C. Fully interlocking control circuit. — X
   - D. Fused control circuit — X
   - E. Fused power circuit for fan and pump starters
   - F. J.I.C. Standards — X

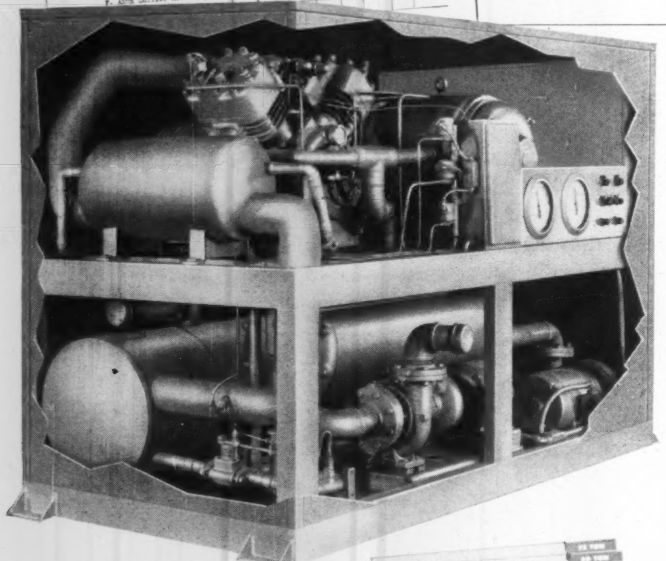
- B. Liquid Line Strainer (Replaceable) — X
- C. Liquid Line Solenoid Valve — X
- D. Thermal Expansion Valve — X
- E. ASME Condenser Relief Valve (Freon) — X
- F. ASME Chiller Relief

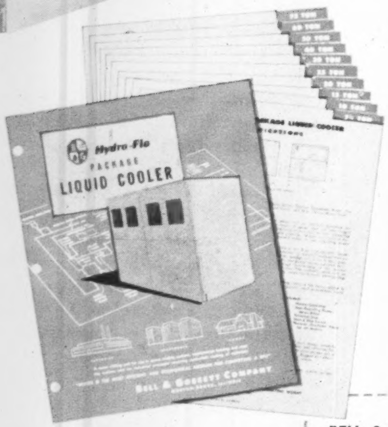
Full operating charge, not a holding charge.

Each unit is tested through the normal range in which operate and it is also tested to a specific condition customer and a certified statement to the unit's exac cap is given at those conditions.

10. Rugged Structural Steel Frame designed for all type of installation, and operations. — X
11. Chiller Water Pump (Piped, Valved, Wired) — X
12. Condenser Water Pump (Piped, Valved, Wired) — X

THIS QUICK CHECK WILL SHOW YOU WHY THE B&G PACKAGE LIQUID COOLER OFFERS TOP VALUE IN THE FIELD!





COMPLETE FILE OF SPECIFICATION AND APPLICATION DATA

Engineering data, specifications, evaluation charts, typical applications and prices on the B&G Package Liquid Cooler are included in this file. Send the coupon for your set.

Send for a set of Evaluation Charts as illustrated above—compare the *standard* equipment of the B&G Package Liquid Cooler with that of any other. You'll see for yourself that *you can buy B&G quality at smaller installed cost!*

With this *completely packaged* unit, costs which might otherwise be charged against the job are eliminated. For example—

No inside wiring costs. The finest electrical controls are furnished, *completely wired and fully interlocked!*

No inside piping costs. Both chiller and condenser pumps are sized to specification, mounted, piped and electrically interlocked.

No structural framing costs. All equipment is mounted on a rugged steel frame—a permanent base.

No metal forming costs. Standard equipment includes a heavy gauge steel jacket with sound-deadening undercoating and Hammerloid finish.

No insulating costs. The suction line and heat exchanger are fully insulated.

No testing costs. Fully tested under specified operating conditions and also under varying load conditions. All valves adjusted and balanced.

No extras to buy. Standard equipment includes gauges, compressor motor, all belts, driving sheave, compressor fly wheel, increment start, full sized heat exchanger and full operating charge of Freon.

Capacities: Ten units from 7½ to 75 tons

BELL & GOSSETT
COMPANY
Morton Grove, Illinois
Canadian Licensee: S. A. Armstrong Ltd.,
1400 O'Connor Drive, Toronto 16, Ontario

BELL & GOSSETT COMPANY, Dept. REZ-5, Morton Grove, Illinois

Please send complete file of data on B&G Package Liquid Coolers.

*Name*____________________

*Firm Name*____________________

*Address*____________________

*City*__________ *Zone*____ *State*______

EQUIPMENT DEVELOPMENTS

Continued

1, 1½, 2, 3 in. sizes for 1750 or 3500 rpm. Construction features include graphite impregnated steady bearing, stainless steel pump shaft, optional bronze impeller.

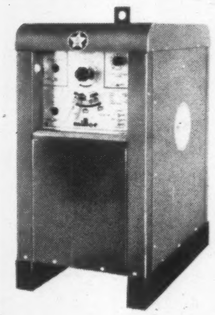
Chiller . . .

. . . in 10 ton unit added to company's line—*Brown Products Co., Dept. HPAC, 97-12 Metropolitan Ave., Forest Hills, N. Y.*

Comes completely factory assembled, charged with refrigerant. Wiring housed in terminal box. Line of chillers now includes 2, 3 hp air cooled sizes, 5 to 25 ton water cooled sizes.

Welders . . .

. . . for inert gas, metallic arc processes — *Miller Electric Mfg. Co., Inc., Dept. HPAC, Appleton, Wis.*

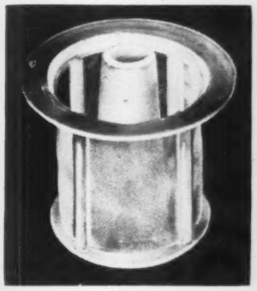


Among cited features in each combination "Gold Star 300" a-c/d-c unit are: new transformer, magnetic amplifier circuit, arc starting control, completely sealed semi-metallic rectifiers, three extra wide current ranges electrically controlled for fine adjustment. Four basic models offer welding range amperages of 2-300, 3-425, 4-550, 17-750.

Control Valves . . .

. . . designed for all types of fluids—*Schade Valve Mfg. Co., Dept. HPAC, 2527 Bodine St., Philadelphia 33.*

Units embody balance, accuracy of control with single seated tight closing construction, company says. Incorporate diaphragm motors of new design for direct, reverse action. Bodies are globe style with screwed, socket weld, butt weld, or flanged connections with ratings to 600 lb. All types, sizes are top, bottom guided.



Filters . . .

. . . designed to withstand rust, corrosion in wide range of applications — *Danielson Mfg. Co., Dept. HPAC, Danielson, Conn.*

Units custom molded in types, sizes, shapes to meet specific filtering requirements. One piece nylon mold-

THE GAS-VENT PIPE THAT IS *Easiest* TO INSTALL

THE SPOTLIGHT IS ON DURA-VENT

DURA-VENT

- **Goes in place fast.** *No tools required.*
- **Double-wall, air-insulated.** *Active air space insures low wall temperature.*
- **Heavy-gauge galvanized outer wall.** *Provides strength, durability.*
- **Aluminum inner wall.** *Heats fast, no condensation.*
- **Vent cap of novel design.** *Aids, not hinders draft.*
- **No sharp edges.** *No cut fingers.*
- **Available in round and oval in all common sizes and with all necessary fittings.** *Easy to meet any architectural requirement.*

DURA-VENT has representatives in all principal cities of the United States and Canada. Complete warehouse stocks are maintained in Atlanta, Chicago, Dallas, Kansas City, Louisville, Memphis, Newark, and Redwood City, California. For further details, contact your local representative or write to

Build in DURABILITY with DURA-VENT

DURA-VENT CORPORATION
Affiliate of Peerless Mfg. Div. of Dover Corp.

Factory and Western Sales Office:
2525 El Camino Real, Redwood City, Cal.

National Sales Office:
Louisville 1, Ky.

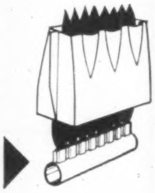
So beautiful! So efficient!

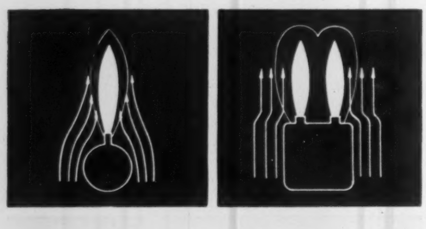
Magnificent MODINE gas unit heater

☆ Years ahead in styling
☆ Years ahead in performance

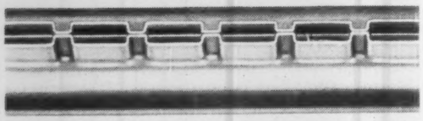
Modine gas-fired unit heaters' distinctive modern lines are enhanced by the perfect blending of sparkling chrome and a restful gray-green finish. It's a great performer too . . . gives you instant heat, long-lasting service. And because Modines are up to 50% lighter, they cost less to ship and install. Eight AGA-approved sizes are available from 25,000 to 310,000 Btu.

FAST, UNIFORM HEAT. Continuous, even flame from front to rear of individually and directly fired tubes boosts radiant heat absorption and uniform heat distribution.

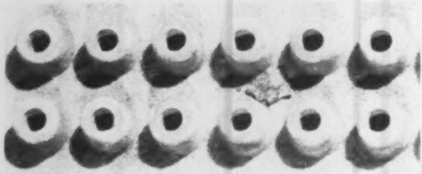




MAXIMUM COMBUSTION EFFICIENCY is delivered by Modine design (far left) because adequate air supply is assured. Contrast this with the conventional double-row arrangement shown.



SELF-CLEANING PORTS. Knife-sharp Modine stainless steel ports (left) have four times the free area of drilled ports (left below). Keen edges resist lodging of dirt and scale . . . permit clean, steady burning.



See the Modine representative listed in your classified phone book or use this handy coupon.

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MANUFACTURING COMPANY

MODINE MFG. CO.
1509 DeKoven Ave., Racine, Wisconsin

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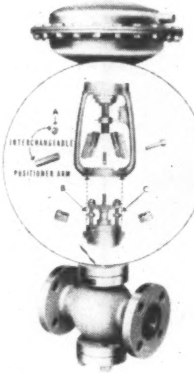
City.............................Zone.... State.........
GU-1347

EQUIPMENT DEVELOPMENTS

Continued

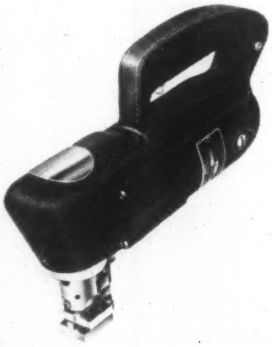
ings with nylon mesh, supporting structural frame injection-welded together in permanent bond. Filters used for filtration of lube, diesel, hydraulic oils, water, air, etc.



Actuator . . .

. . . with new split coupling which joins spring stem to valve plug stem — *Hammel-Dahl Co., Dept. HPAC, Warwick Industrial Park, Providence 5, R. I.*

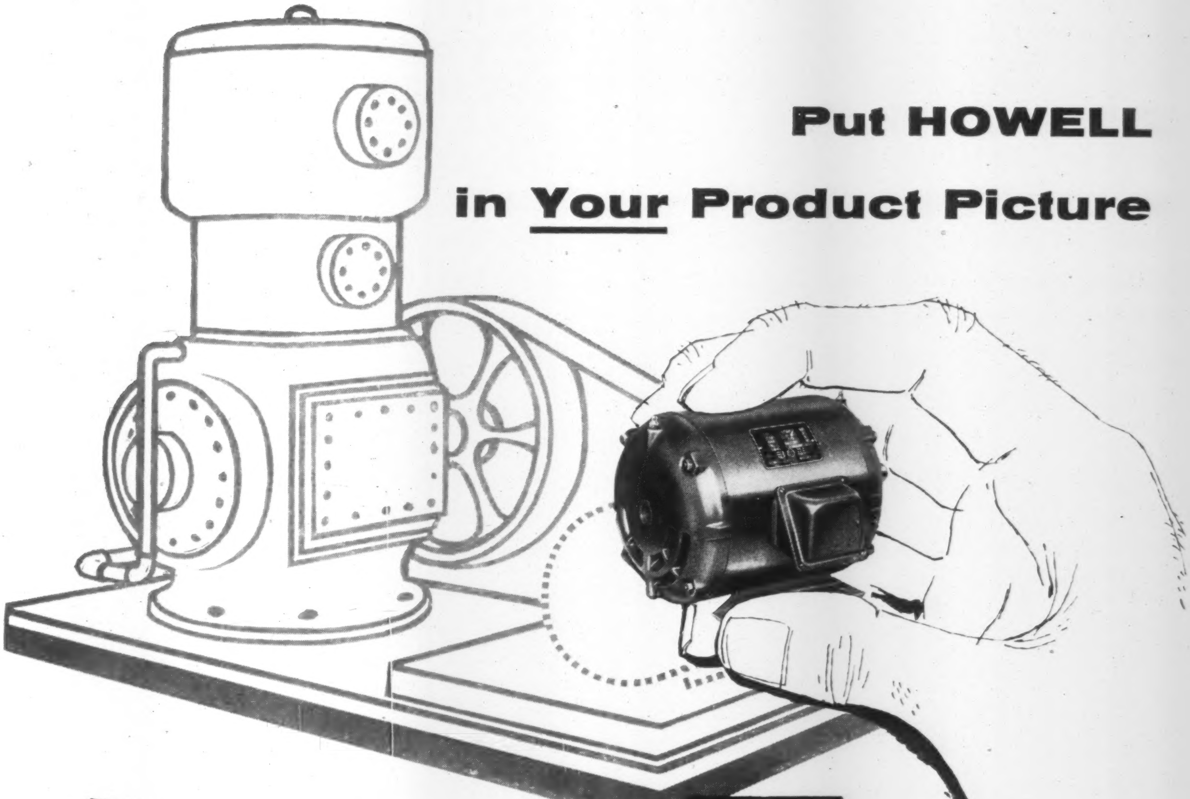
Unit may be removed without disturbing packing box bolting. Coupling has upper, lower threads; acts as turnbuckle for adjustment of plug seating tension, company says. Equipped with universal bracket for mounting in any position. Available in spring ranges 3-15, 5-25, 6-30 psi.



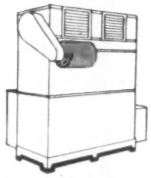
Nibbler . . .

. . . for cutting titanium, stainless, nonferrous metals — *Fenway Machine Co., Dept. HPAC, Willow Grove, Pa.*

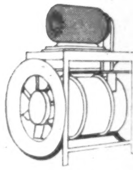
Cuts to 55 in. per min with mini-



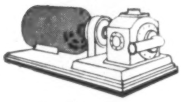
Put HOWELL in *Your* Product Picture



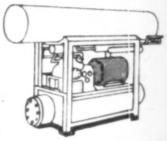
COOLING TOWERS



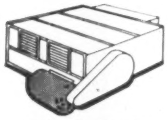
BLOWERS



PUMPS



PACKAGED CHILLERS



CENTRAL SYSTEM CONDITIONERS

. . . and gain the PLUS values in power that count!

Your most efficient air conditioning equipment depends . . . year in and year out . . . on the motor you select to power it. That's why so many manufacturers in the air conditioning industry fill their specifications for integrals, 1 thru 300 hp, with Howell Motors. *Note these features:*

EXTRA DEPENDABILITY that challenges the years. Howell's new principle of heat-source ventilation . . . double sealed bearings . . . tough rolled steel frames and precision fitted cast iron end plates . . . these and many more are plus values that ***count!***

AN UNSURPASSED REPUTATION for engineering excellence and quality manufacture . . . built up by Howell in over 40 years of serving industry's motor requirements.

TOPS IN APPEARANCE. No other industrial motors have such smooth, unbroken contours . . . without an external fin or rib to mar their looks or catch dust deposits.

Howell makes virtually every type of AC industrial motor . . . fractional and integral to 300 hp, in all standard enclosures, in rerated and non-rerated frame sizes, and in many pump mountings. Howell part winding motors, for reduced voltage starting of compressors, pumps, etc., may be of special interest to you.

These motors are specified and used by these leading manufacturers of air conditioning equipment:

York Corp. ● Acme Industries ● Worthington Corp. ● Frick Corp. ● The Trane Co. ● Binks Manufacturing Co. ● American Blower Corp.

A Howell sales engineer can give you valuable assistance on any motor application. Wire or 'phone collect . . . or drop us a line . . . you'll get prompt action. Howell Electric Motors Co., Howell, Michigan.

HOWELL Red Band MOTORS

HOWELL *motors*

. . . precision built for industry since 1915

The sign of smooth sale-ing . . . **SKUTTLE**

brings you NEW permanent filters designed for permanent acceptance

Skuttle-Aire Permanent Air Filters offer you, in addition to the added profits that go with an in-demand product, the kind of consumer satisfaction that builds repeat business . . . establishes you as "the right guy to do business with," an important foothold to gain in this booming filter market in heating and air conditioning!

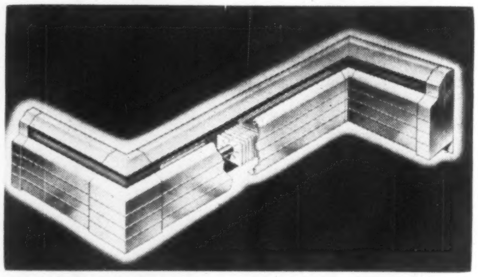
Skuttle-Aire Filters have been carefully designed to do the best filtering job possible. The quality of materials used along with the sturdy fabrication of a Skuttle-Aire Filter spell out quality all the way through. Compare these features with any other permanent filter on the market: Heavy gauge rigid one piece aluminum frame; expanded metal grills and internal corrugated metal screen for added strength and greater filtering capacity; four layers of Thermo Plastic filtering media —woven of continuous monofilaments for uniform filtration, minimum air resistance, inherent electrostatic properties.

Skuttle-Aire Filters are available in standard as well as special sizes in both 1" and ½" thicknesses. Stock Skuttle-Aire today.

Skuttle MANUFACTURING CO.
MILFORD, MICH.

ELECTRIC RADIANT HEATERS
HUMIDIFIERS
PERMANENT FILTERS

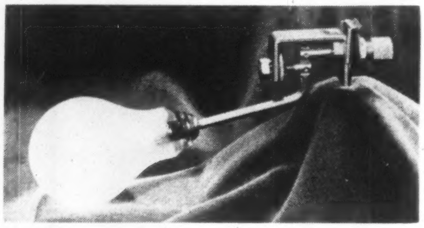
mum radius of 6 in. For shorter 3 in. radius, special die holder available for use on 12 gage stainless, lighter metal. Weighs 13 lb, measures 13 in. in length.



Baseboard Heating Unit . . .

. . . designed to deliver high Btu ratings per lineal foot — *Radiant-Ray Radiation, Inc., Dept. HPAC, Newington, Conn.*

Higher Btu output obtained through redesigned enclosure and fin-tube proportions, supplemented by damper vane which controls air currents, company says. Unit available in 1½, 3, 4, 5, 6, 8 ft lengths.



Valve . . .

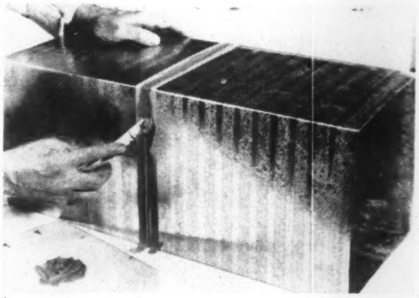
. . . for humidification units—*Skuttle Mfg. Co., Dept. HPAC, Milford, Mich.*

Unit has close tolerance for all working parts which prevents clogging, jamming, leaking, company says. When rising water level forces float upward, valve closes as valve jet moves into special resilient seat designed to prevent leakage as it seals valve. Float made of glass. Shaft is run into bulb through rubber sealer. Valve may be set for any water level, remains permanently set, according to manufacturer.

Tubular Heater . . .

. . . sheathed with stainless steel tubing for maximum resistance to high temperatures, oxidation, corrosion — *Carpenter Steel Co., Alloy Tube Div., Dept. HPAC, Union, N.J.*

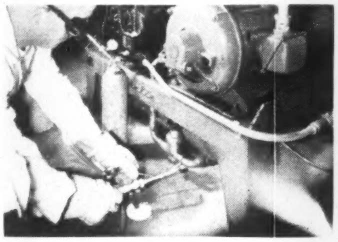
Sheathing, made from welded stainless tubing, is ½ in. OD with wall thickness of 0.062 in. Withstands temperatures to 1500 F, protects heater against corrosive wear, company says. Adaptable to heating asphalt pipelines, liquid solutions, etc.



Epoxy Resin Cement . . .

. . . in self metering tubes designed for various applications—*Smooth-On Mfg. Co., Dept. HPAC*, 572 *Communipaw Ave., Jersey City 4, N. J.*

"Metalset A4" comes packed in two collapsible tubes. Proper proportions of resin, low-toxicity catalyst measured automatically by squeezing out identical lengths of each material from its respective tube. Features cited: completely water and oilproof, resists acids and alkalis, nonflammable. Can be applied to vertical surfaces without sagging, company says. Available in bulk, $10\frac{1}{2}$ oz tubes.



Air-Acetylene Torch . . .

. . . for servicing air conditioning, refrigeration equipment — *Smith Welding Equipment Corp., Dept. HPAC*, 2633 *Fourth St., S.E., Minneapolis* 14.

"Handi-Heet" is lightweight, adjustable to any position convenient to operator, says company, and flexible o-rings form gas tight seal between tip mixing section and torch head. Within each tip is individual mixer said to add correct amount of atmospheric air to acetylene to give desired flame. Designed to be attached to any acetylene tank. Six tips available.

Portable Pumping Unit . . .

. . . mounted upon packaged pumping system—*Eco Engineering Co., Dept. HPAC*, 12 *New York Ave., Newark* 1, *N. J.*

Furnished with $\frac{3}{4}$ in. bronze pump, unit equipped with phenolic or neoprene impellers, carbon bearings, split Teflon asbestos packing rings. Driven by 1/3 hp heavy duty motor, pump has capacity to 10 gpm, pressures to 75 psi. Weighs 55 lb., measures 24 in. long, 17 in. deep.

The sign of smooth
sale-ing . . . SKUTTLE
brings you NEW
automatic humidification
at less cost

With the introduction of the Model 800 Humi-dial, Skuttle offers automatic humidification at a new, low cost. Here is the electric humidifier for the mass market, with all the capacity of the most expensive unit . . . 24 quarts of water a day . . . but with a price tag that invites comparison!

The Skuttle Humi-dial eliminates the humidistat and relay transformer — is adjusted for proper degree of humidification right at the humidifier. From this point on the operation of the Humi-dial is basically the same as the proven Model 400 Humidimatic. Vapor is produced independent of the heat from the plenum by the use of a 625 Watt element in the water pan. The Model 800 is also equipped for automatic water feed. A new, improved water feeder regulates a constant water volume.

Stock the new Skuttle Humi-dial now and profit from increased automatic humidifier business.

Skuttle MANUFACTURING CO.
MILFORD, MICH.

ELECTRIC RADIANT HEATERS
HUMIDIFIERS
PERMANENT FILTERS

DOUBLE MECHANICAL SHAFT SEALS

PERMANENTLY LUBRICATED BALL BEARINGS

These two advanced features of

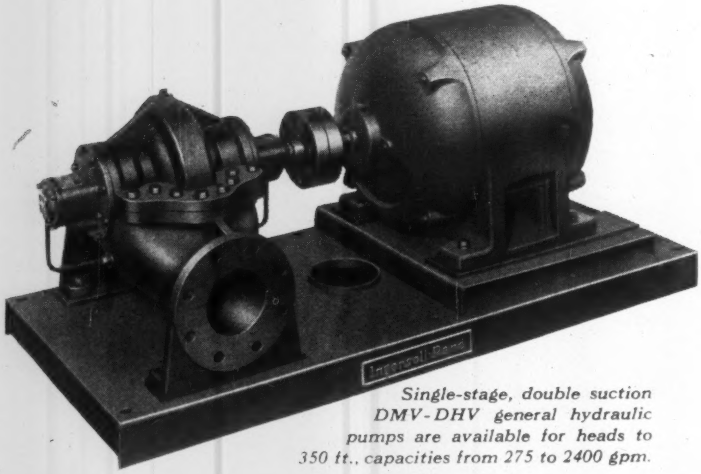
DMV-DHV PUMPS

end pump maintenance problems

Used in place of conventional packed stuffing boxes, Double Shaft Seals eliminate the need for periodic inspections and repackings. Performance-proved and self-adjusting, they require no attention throughout their entire service life.

Sealed, Cartridge-Type Ball Bearings do away with the necessity of greasing or oiling pump bearings. Here, in the DMV-DHV pump, the bearing lubricant is permanently sealed in—and assures years of successful operation.

You can install this modern I-R pump anywhere due to the greater compactness obtained with this modern construction. It is the simplest, most maintenance-free pump ever built by Ingersoll-Rand for general hydraulic service. Write for Bulletin 7248-A, or see your nearest I-R branch office.



Single-stage, double suction DMV-DHV general hydraulic pumps are available for heads to 350 ft., capacities from 275 to 2400 gpm.

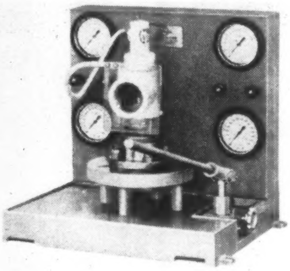
Ingersoll-Rand

10-288 Cameron Pump Division
11 Broadway, New York 4, N. Y.

PUMPS • CONDENSERS • TURBO-BLOWERS • COMPRESSORS • ROCK DRILLS
DIESEL & GAS ENGINES • AIR & ELECTRIC TOOLS

EQUIPMENT DEVELOPMENTS

Continued



Test Stand . . .

. . . for testing pressure equipment without external source of power — *Farris Engineering Corp., Dept. HP-AC, 563 Commercial Ave., Palisades Park, N. J.*

New bench type hydraulic, pneumatic "Porta-Tester" designed for testing safety, relief, globe, gate, plug, other valves; pressure vessels; piping; pump cases. Recommended by company for liquid testing to 3000 psi of male screwed valves ½ in. to 3 in., female screwed valves ½ in. to 1 in., flanged valves to 4 in. with 600 lb ASA flanges. Unit furnished with mounting adapters, hand pump, gages, air connection for seat leakage testing.

Flux Cored Alloy . . .

. . . for joining dissimilar combinations of metals—*Eutectic Welding Alloys Corp., Dept. HPAC, Flushing 58, N. Y.*

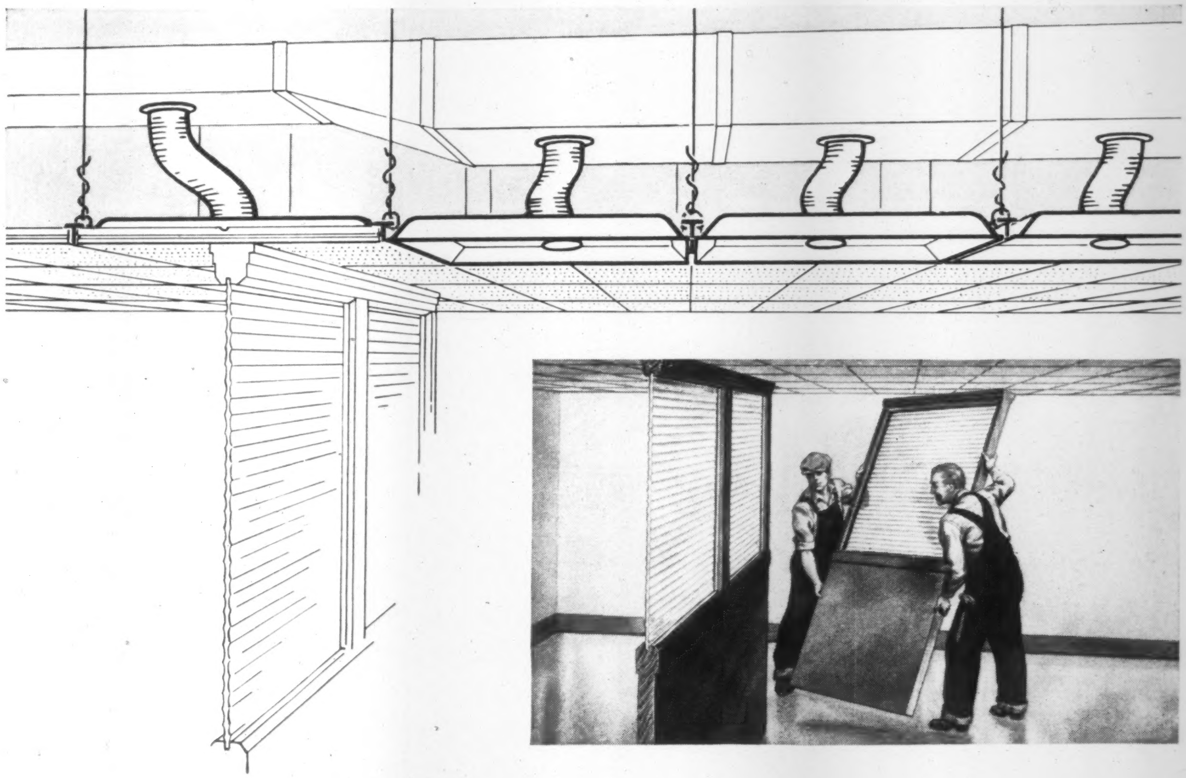
"EutecRod 158-B" is coil form alloy featuring unique fluxing action, tinning ability, high strength on all metals normally soldered, company says. Metals include steel, stainless steel, copper, brass, bronze. Application temperature range is 400 to 500 F. Produced in ⅛, 1/16, 3/64 in. diameters.

Valves . . .

. . . with screw ends, flanges, flanged brass connectors — *Dersch, Gesswein & Neuert, Inc., Dept. HPAC, 4849 W. Grand Ave., Chicago 39.*

Units offered in globe, angle designs. Features cited: extra heavy stems, back seating, full size ports, passageways. Small, large sizes have

eliminates air conditioning problems when relocating partitions...



multi-vent®

LOW VELOCITY AIR DIFFUSERS

For architects and engineers designing air conditioned modular office space, Multi-Vent solves a troublesome problem. Multi-Vent air diffusing panels, once installed flush in the ceiling, need not be moved, altered in any way, or even adjusted when partitions are moved to suit tenants' changing needs.

Since Multi-Vent introduces conditioned air through the perforations in standard acoustical ceiling pans at low velocity, and since the air is gently diffused downward into the room, there is no "throw" or "blow" to bounce off nearby partitions. It is for this reason that a partition may actually bisect a Multi-Vent panel without affecting comfort conditions in the surrounding area.

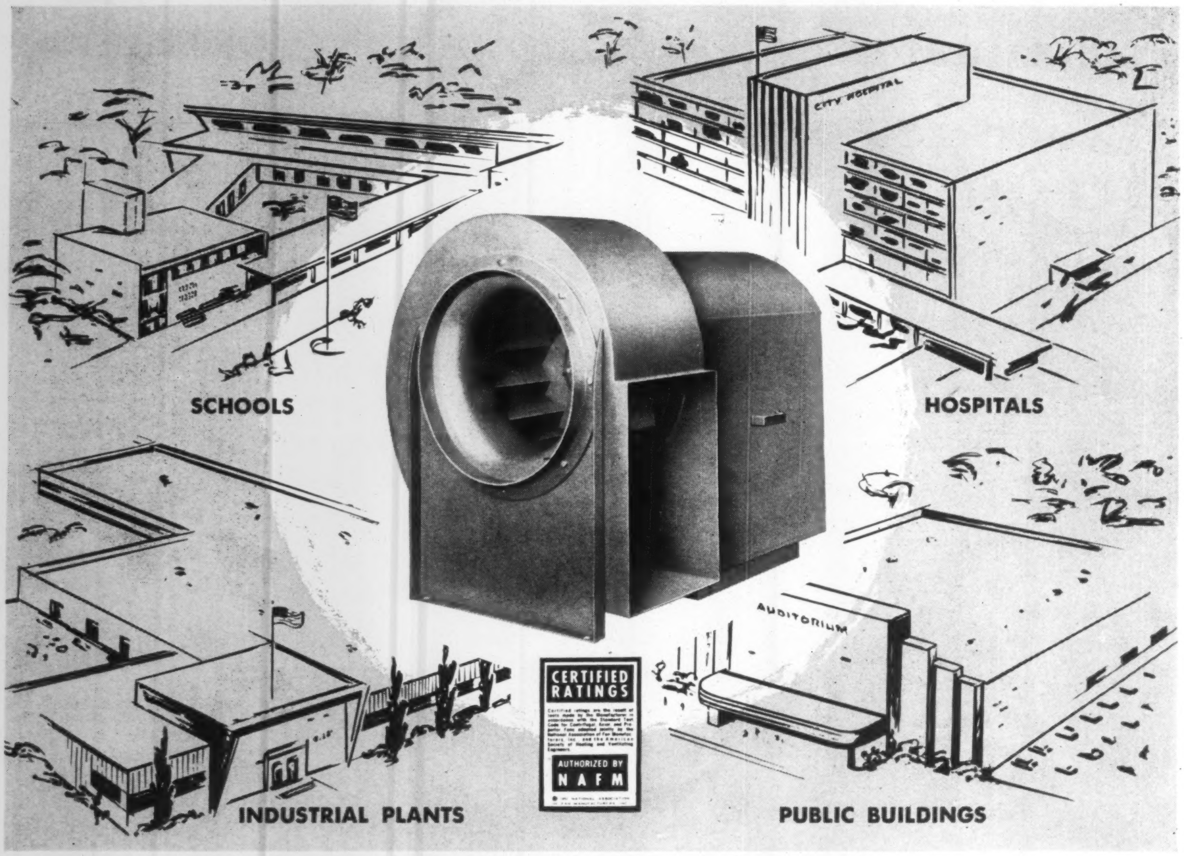
Write for detailed literature and name of representative in your area.

multi-vent division of THE PYLE-NATIONAL COMPANY

WHERE QUALITY IS TRADITIONAL

1373 North Kostner Avenue, Chicago 51, Illinois

SALES AND ENGINEERING REPRESENTATIVES IN PRINCIPAL CITIES OF UNITED STATES AND CANADA


CITY HOSPITAL
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INDUSTRIAL PLANTS
PUBLIC BUILDINGS

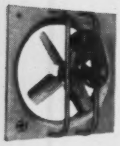
A Peerless Blower for Every Application

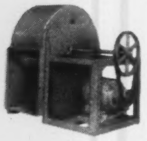
Quiet, dependable, trouble-free Peerless blowers require a minimum of installation space and reduce mounting costs. They offer countless discharge arrangements. The entire unit is built by Peerless, including the motor.

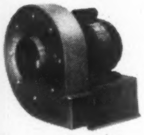
Peerless blowers meet and excel industry standards. They have been thoroughly tested according to test codes. Thousands of them are providing economical, continuous ventilation in installations all over the country.

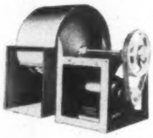
Write today for Bulletins SDA-160, SDA-200 and SDA-220!

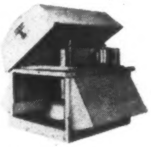
A COMPLETE LINE OF AIR MOVING EQUIPMENT









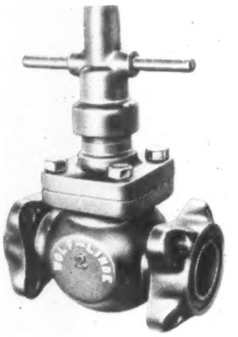


Charter Member of the Air Moving and Conditioning Association, Inc. (AMCA)

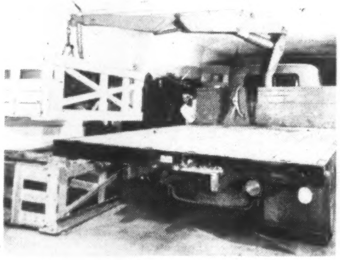
Peerless Electric

FAN AND BLOWER DIVISION
THE Peerless Electric® COMPANY
1409 W. MARKET ST. • WARREN, OHIO
FANS • BLOWERS • ELECTRIC MOTORS • ELECTRONIC EQUIPMENT

Look for our
Catalog
in Sweet's



threaded bonnets, bolted bonnets, respectively. Available in sizes ½ to 6 in.



Truck Crane . . .

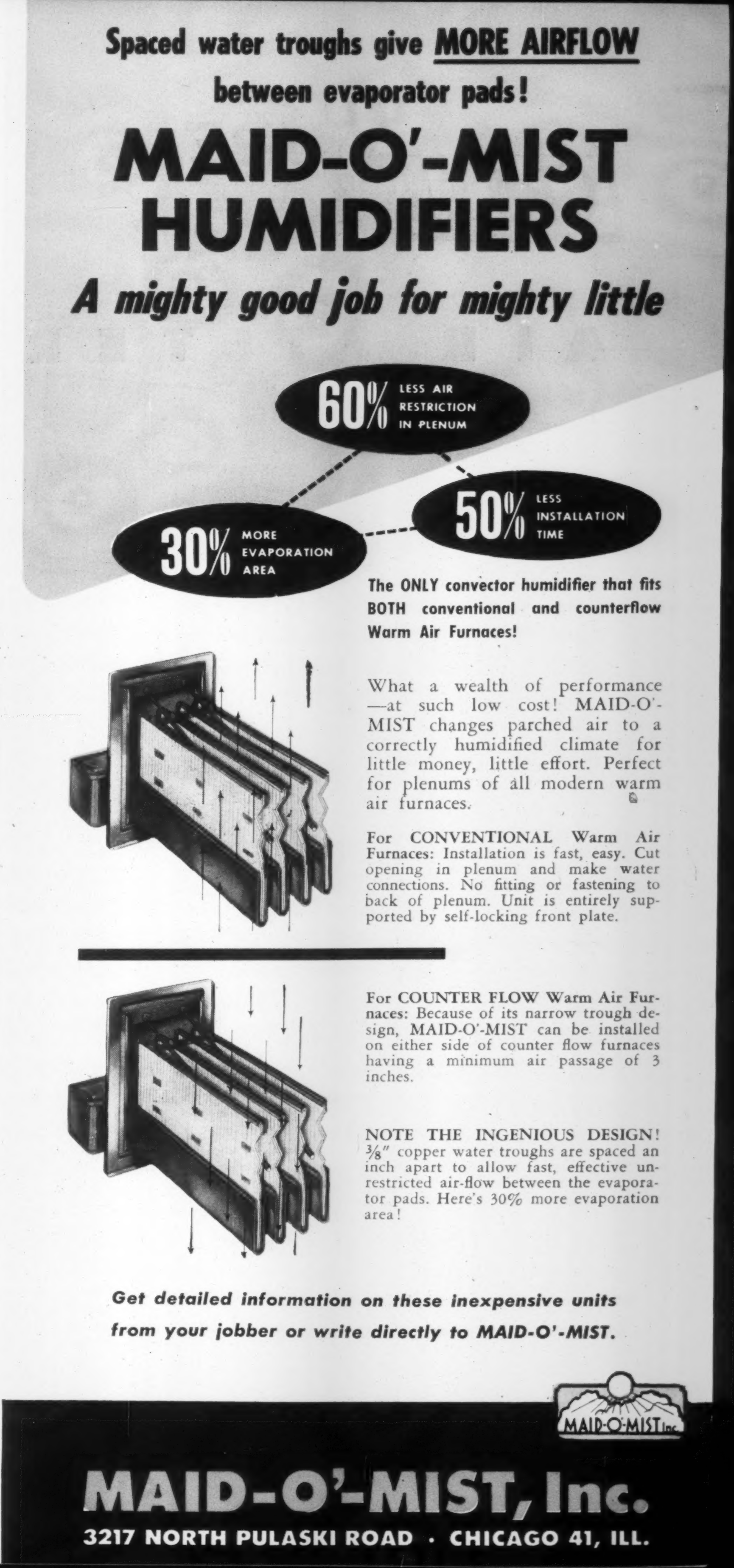
. . . for lifting air conditioning, heating, and ventilating equipment, sheet metal — *Stanco Mfg. and Sales, Inc., Dept. HPAC,* 1931 *Pontius Ave., Los Angeles* 25.

"Hiab 170" requires only 15 in. of space between cab and truck bed, leaving entire truck bed open for load, says company. Lifting capacity is 6000 lb on shortened boom of 5 ft to 2500 lb on full boom of 13 ft. Crane will lift to 20 ft above ground level at maximum speed of 20 in. per second and swings in 360 deg arc.

Positioning Device . . .

. . . adapted for setting directionally sensitive flow probes in fluid streams where depth of immersion, angle of rotation are measured — *Aerotech Specialties, Inc., Dept. HPAC, Glastonbury, Conn.*

Pressure seals can be provided for sizes ⅛ to ½ in. Immersion depth can be measured to 0.01 in. with vernier, rotation to 0.2 deg with



Spaced water troughs give MORE AIRFLOW between evaporator pads!

MAID-O'-MIST HUMIDIFIERS

A mighty good job for mighty little

60% LESS AIR RESTRICTION IN PLENUM

50% LESS INSTALLATION TIME

30% MORE EVAPORATION AREA

The ONLY convector humidifier that fits BOTH conventional and counterflow Warm Air Furnaces!

What a wealth of performance—at such low cost! MAID-O'-MIST changes parched air to a correctly humidified climate for little money, little effort. Perfect for plenums of all modern warm air furnaces.

For CONVENTIONAL Warm Air Furnaces: Installation is fast, easy. Cut opening in plenum and make water connections. No fitting or fastening to back of plenum. Unit is entirely supported by self-locking front plate.

For COUNTER FLOW Warm Air Furnaces: Because of its narrow trough design, MAID-O'-MIST can be installed on either side of counter flow furnaces having a minimum air passage of 3 inches.

NOTE THE INGENIOUS DESIGN! ⅜" copper water troughs are spaced an inch apart to allow fast, effective unrestricted air-flow between the evaporator pads. Here's 30% more evaporation area!

Get detailed information on these inexpensive units from your jobber or write directly to MAID-O'-MIST.

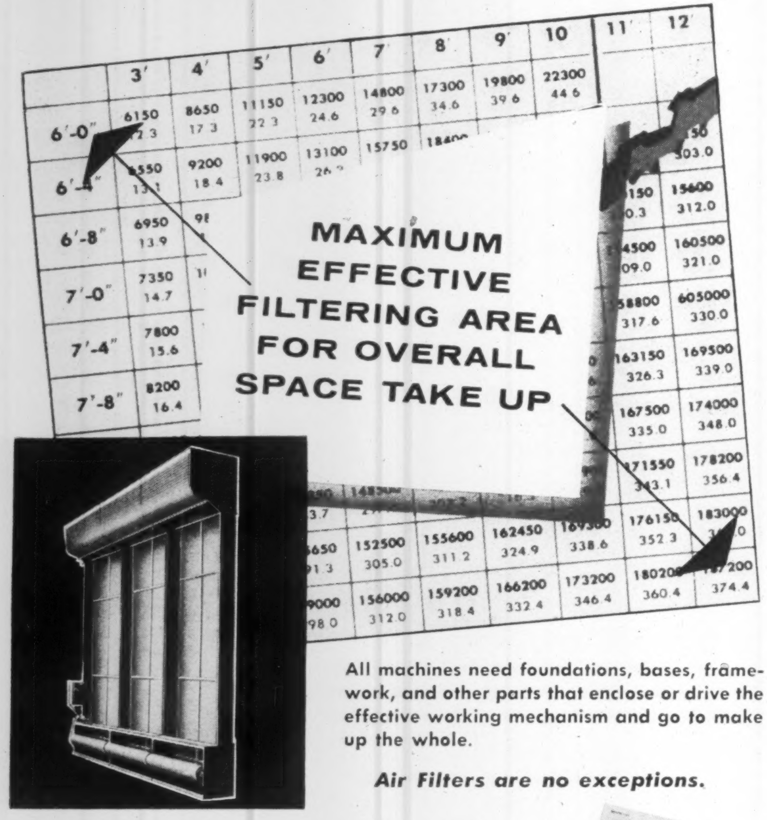
MAID-O-MIST Inc.

MAID-O'-MIST, Inc.

3217 NORTH PULASKI ROAD · CHICAGO 41, ILL.

GREEN SURE SEAL*

AIR FILTER



All machines need foundations, bases, framework, and other parts that enclose or drive the effective working mechanism and go to make up the whole.

Air Filters are no exceptions.

If you need an air filter and are somewhat crammed for space, we suggest that you look into the merits of the GREEN *Sure Seal* AIR FILTER. Because of its unique design and method of supporting the feed and take up rolls, maximum effective filter area is provided. The entire surface of the filter media that is exposed is usable.

The area difference between the Sure Seal and conventional air filter may be only a few inches or feet, but it can make a big difference when trying to incorporate the unit in existing buildings or in new buildings where space and other structural factors must be considered. You will want the most filter area for the space taken up.

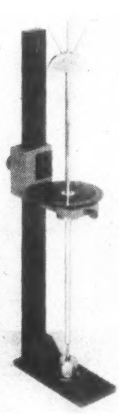
You can have confidence in the Green Line of products—which have been world-wide since 1845.

Clean Air
GREEN'S AIR FILTER

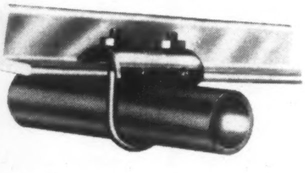
Our Bulletin #175 gives overall dimensions vs. capacity tables. Send for a copy and study this particular space-saving value.

*U.S. Patents Pending

THE GREEN
POWER AND PROCESS PLANT EQUIPMENT
FUEL ECONOMIZER COMPANY INC.
BEACON 3, NEW YORK
Representative in Principal Cities



rotatable vernier scale. All scales have white lines on black surfaces with minimum spacing of 0.05 in. for maximum visibility in poor lighting, company says.



Pipe Hanger . . .

. . . designed to retain constant effective clamping tension by spring action in saddle — *Ramco Mfg. Co., Dept. HPAC, 540 Westfield Ave., W. Roselle Park, N. J.*

New "Type X" can be used with standard pipe or rigid steel conduit for mounting on structural flanges to ⅞ in. thick. Each hanger furnished with standard electrogalvanized steel u-bolt and nuts assembled ready for use. Available in ⅜ in. to 2 in. pipe size. Saddle made of heavy gage steel.

Analyzers . . .

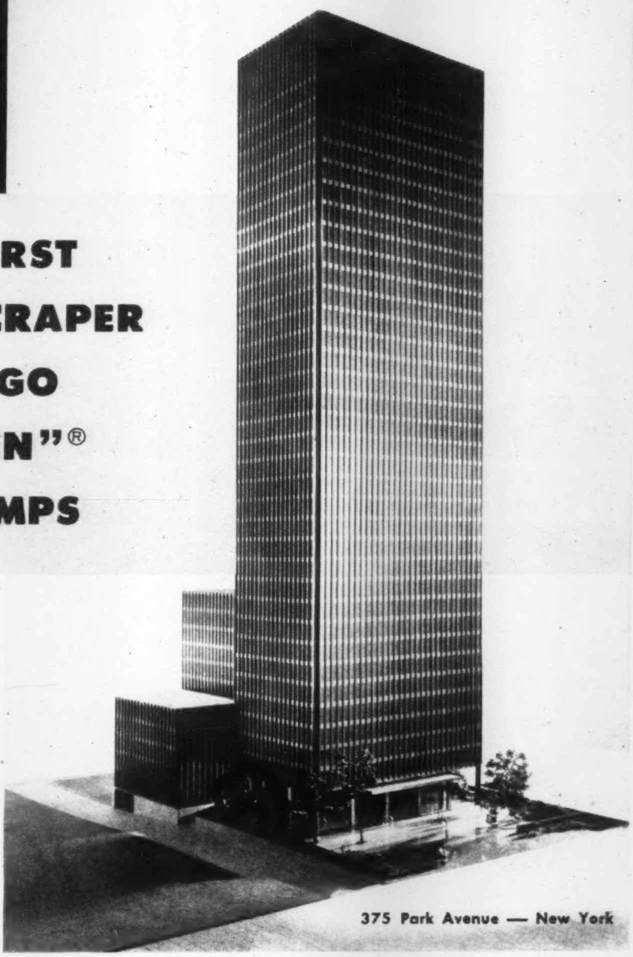
. . . for analyzing water for total hardness or silica concentration — *Milton Roy Co., Dept. HPAC, 1300 E. Mermaid Ln., Philadelphia 18.*

Silica analyzer has range to 0.05 ppm; range of total hardness analyzer is 0-3 and 0-5 ppm with sensitivity of 0.03 and 0.05 ppm, respectively, calibrated as calcium carbonate.

"from Chicago"

MODERN TODAY
MODERN IN 2007 A.D.

WORLD'S FIRST BRONZE SKYSCRAPER HAS CHICAGO "FLUSH KLEEN"® SEWAGE PUMPS



375 Park Avenue — New York

MIES van der ROHE and PHILIP JOHNSON
architects

KAHN & JACOBS
associate architects

JAROS, BAUM & BOLLES
mechanical engineers

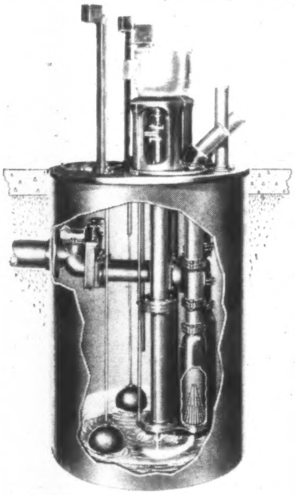
GEORGE A. FULLER CO.
general contractors

EUGENE DUKLAUER, INC.
plumbing contractor

• The new 375 Park Avenue Building, New York, literally has EVERYTHING— and *everything* is QUALITY. Quality ideas, plans, materials and workmanship have provided such modern conveniences as year-round peripheral zoned air conditioning with balanced humidity and finger-tip control, 18 electronically controlled high-speed elevators, closed circuit color television, special non-glare exterior glass walls, etc. Chicago "FLUSH KLEEN"® Sewage Pumps have provided for continuous, trouble-free waste disposal service.

More than 12,000 Chicago "FLUSH KLEEN"® Sewage Pumps have been installed as standard equipment in fine buildings everywhere — and NOT ONE HAS EVER CLOGGED. Only liquid reaches the pump impeller. There is no contact between the pump's working parts and coarse sewage material.

This is why Chicago Pump Company "FLUSH KLEEN"® Sewage Pumps have an unequalled record of clog proof performance and are preferred throughout the building industry.



"FLUSH KLEEN"® Sewage Pump . . . Automatically Backwashes Strainer . . . Strainer Keeps Solids From Basin and Pump . . . Water Only Handled By Impeller.

CHICAGO PUMP COMPANY

Building Pumps

Subsidiary of Food Machinery & Chemical Corporation

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FOOD MACHINERY AND CHEMICAL CORPORATION

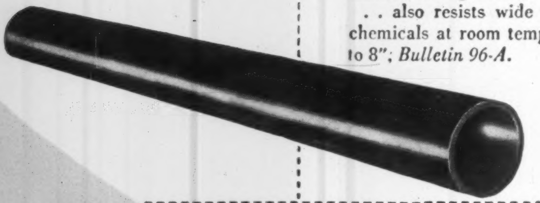
622 Diversey Parkway
Chicago 14, Illinois

Only the
Right piping
can deliver a
"GOOD RUN"

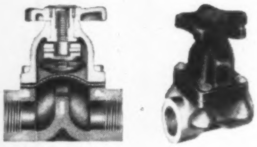
For profitable runs you must keep equipment "on stream" full time with no corrosion shut-downs. Protect your profits with Ace piping, pumps, valves, and tanks. Many rubber and plastic materials . . . backed by a century of chemical experience. Get facts today from American Hard Rubber Company.

FOR HOT CORROSIVES:
ACE TEMPRON

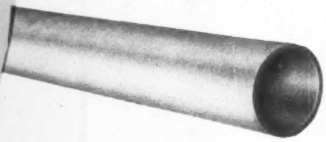
Heat-resistant nitrile hard rubber pipe handles inorganics at 250-275 deg. F. . . also resists wide range of organic chemicals at room temperature. Sizes 1" to 8"; *Bulletin 96-A.*



VALVES
for all-plastic piping systems



Trouble-free plastic diaphragm valves . . . choice of general-purpose ACE-ITE, ACE PARIAN (polyethylene) or ACE SARAN. Handles most corrosive chemicals and food ingredients. Sizes ½" to 2", 50 psi. at 77 deg. F. *Bulletins 80 and 351.*



RIGID VINYL . . . STRONG, AGE-PROOF

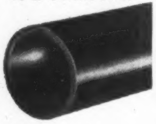
ACE RIVICLOR is a new rigid threaded plastic pipe with good aging and high impact strength. Not affected by most inorganic acids and alkalis, also excellent for many organics. Sizes ½" to 4". *Ask for Bulletin CE-56.*

TOUGH ACE-ITE PLASTIC PIPE

General-purpose moderately priced rubber-plastic pipe handles most common chemicals to 170 deg. F. . . . except few strong acids and organic solvents. Tough, odorless, tasteless. Rigid pipe ½" to 6". *Bulletin 80.*

STAYS TOUGH
AT SUB-ZERO TEMPERATURES

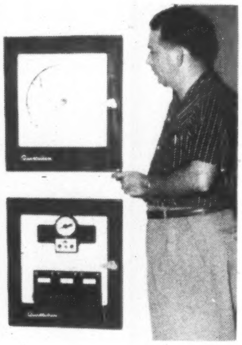
ACE PARIAN . . . odorless, tasteless, rigid polyethylene. Best chemical resistance of any plastic at room temp. except to acetic acid. Excellent impact strength at sub-zero temp. Rigid pipe ½" to 2". *Bul. 351.*



ACE processing equipment of rubber and plastics

AMERICAN HARD RUBBER COMPANY
Ace Avenue • Butler, New Jersey
DIVISION OF AMERACE CORPORATION

EQUIPMENT DEVELOPMENTS
Continued

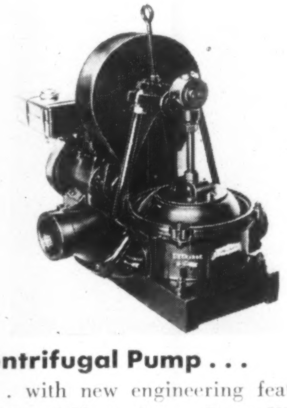


Other ranges available to meet special applications. Each silica analysis takes 12 minutes; each hardness analysis, 6 minutes. Units equipped with adjustable "high-lo" limit switches that can be set at any value within instrument range. Alarms or control devices may be included, says company.

Driers . . .

. . . with "Abso-Dry Pressure Seal" feature — *Henry Valve Co., Inc., Dept. HPAC, Melrose Park, Ill.*

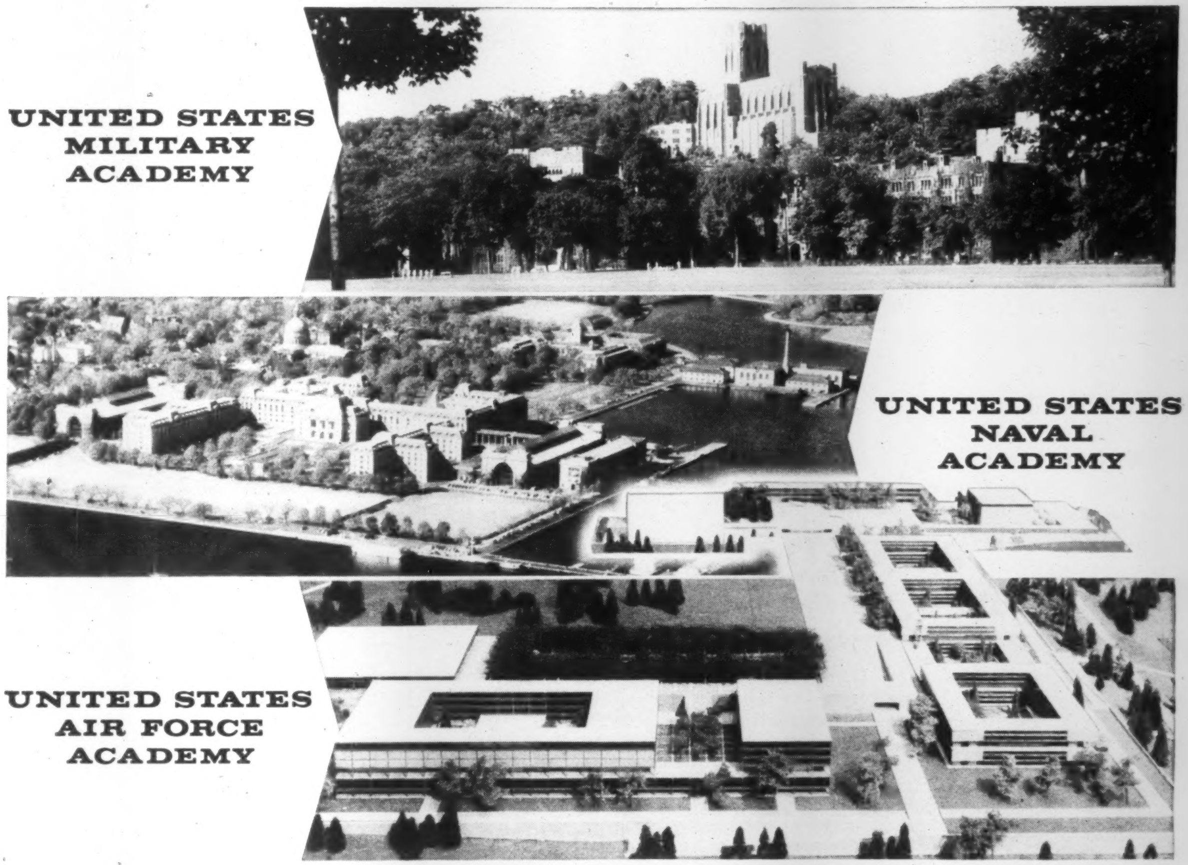
To obtain maximum drying efficiency, company says it reactivates each drier and, by process of manufacture, provides positive indication — by pressure sealing — that drier is tight, dry. When end connection seal is loosened, hissing sound, due to escape of dehydrated air, is heard.



Centrifugal Pump . . .

. . . with new engineering features — *Gen-A-Matic Corp., Dept. HPAC,* 14741 *Bessemer St., Van Nuys, Calif.*

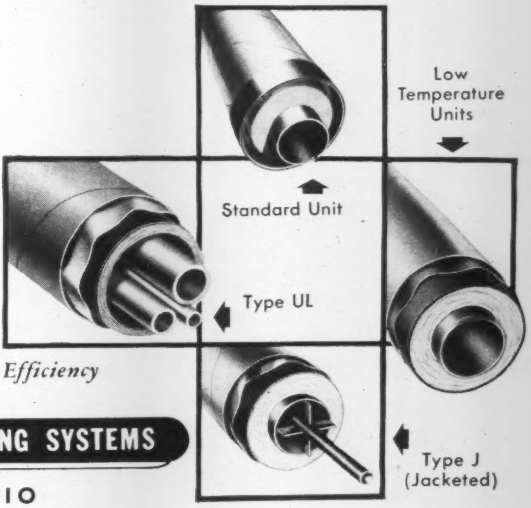
Redesign of wear plate, intake as-


UNITED STATES MILITARY ACADEMY
UNITED STATES NAVAL ACADEMY
UNITED STATES AIR FORCE ACADEMY

Photographs courtesy United States Military Academy, United States Naval Academy, and United States Air Force Academy.

Ric-wiL underground piping systems serve ALL three...West Point, Annapolis and NOW...the new Air Force Academy

West Point and Annapolis have been serviced by Ric-wiL piping systems as far back as 1931. Since 1946 alone over 15,000 feet of Ric-wiL prefabricated piping has been purchased for the nation's top military colleges. Installation of Ric-wiL piping at the new 17,500 acre United States Air Force Academy has already been installed. Ric-wiL is indeed proud of the part they have played in serving these military academies for a period of over twenty-five years.

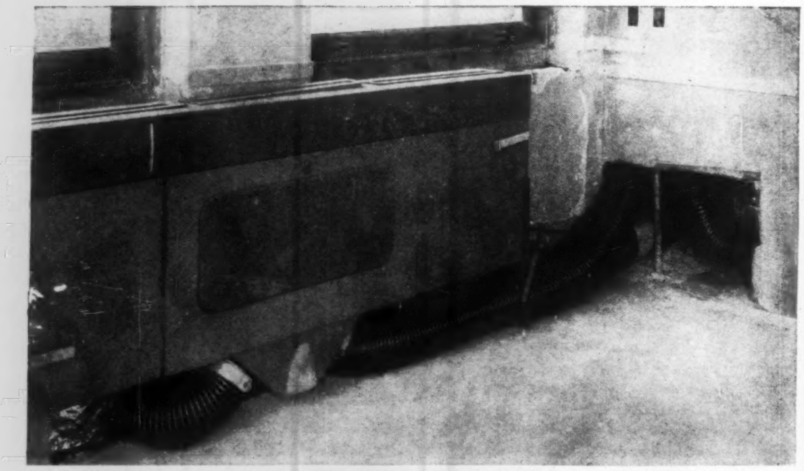

Low Temperature Units
Standard Unit
Type UL
Type J (Jacketed)

Quality Piping Systems . . .
. . . of Exceptionally High Thermal Efficiency
SINCE 1910

Ric-wiL INCORPORATED **PREFABRICATED INSULATED PIPING SYSTEMS**

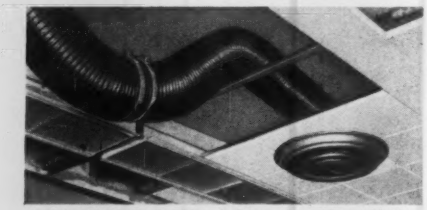
BARBERTON, OHIO

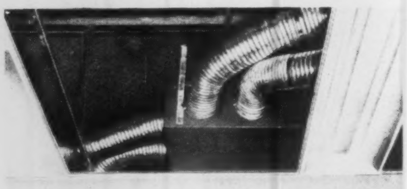
IN CANADA: THE **Ric-wiL** COMPANY OF CANADA LIMITED

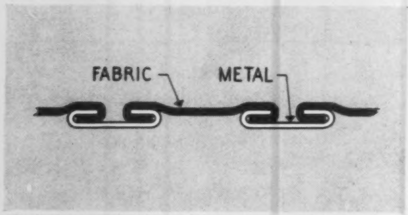

The Travelers Insurance Co., Hartford—Wiremold connected to underwindow unit in modernized building.

MAKES CONNECTIONS ANYWHERE

Wiremold flexible Air Duct simplifies installation of underwindow units


Indiana Nat'l Bank Bldg., Indianapolis—Wiremold Air Duct runout from branch duct to ceiling diffuser.


Socony Mobil Bldg., N. Y. C.—Wiremold Air Duct "octopus" in a high-velocity air conditioning system.



Exclusive construction—fabric component and supporting steel spiral are mechanically interlocked.

Installing underwindow air conditioning units can be a tough job. None are tougher than in the modernization of older buildings. But Wiremold's flexibility makes these connections easily. Wiremold is the versatile duct for air conditioning . . . high or low velocity . . . in old or new buildings.

Made by an exclusive process that mechanically interlocks the fabric with the supporting steel spiral, there is no glue to dry out and cause duct failure. As a result, Wiremold Air Duct provides long life and good performance. Its light weight makes it easy to handle — especially important in cramped quarters.

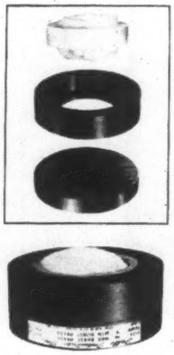
- **good air flow with minimum pressure loss**
- **no air leakage at normal operating pressure**
- **meets National Board of Fire Underwriters requirements**
- **compensates for misalignments between connections**
- **allows for future relocation of units**
- **acts as a vibration damper**
- **easy to cut, fit and install**

SEND FOR FOLDER NO. 591 for further information on Wiremold Air Duct.

WIREMOLD® FLEXIBLE AIR DUCT

THE WIREMOLD COMPANY, HARTFORD 10, CONNECTICUT

sembly, return check valve has improved self-priming action of pump, company says. New spring-loaded mechanical seal assembly eliminates need to keep water in pump at all times to avoid damage to seal.



Rupture Discs . . .

. . . for operating temperatures to 650 F — *Falls Industries, Inc., Dept. HPAC, Aurora Rd., Solon, Ohio.*

Each unit utilizes insulating spacer ring to hold heat insulating material on vessel side of its pressure membrane. Discs accurate to 5 percent of rated burst, available for use at 75 percent of rated burst, unaffected by practically all corrosives, provide almost 100 percent clean rupture to allow maximum opening for safe escape of excess pressure, company says. Available in standard diameters 2 to 12 in. for pressures from full vacuum to 100 psi. On order, discs available to 24 in. diameter at burst ratings to 250 psi.

Push Buttons . . .

. . . with base mounted control mechanism, front accessible wiring terminals — *Furnas Electric Co., Dept. HPAC, Batavia, Ill.*

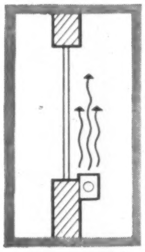
Reversible formed steel base includes knockout pipe connection which provides wiring from either end or straight through. May be furnished with one normally open contact; one closed contact; one open, one normally closed contact on each button. Either two or three button units are standard. Wrap around

How To Control WINDOW DOWNDRAFTS IN CLASSROOMS EFFECTIVELY

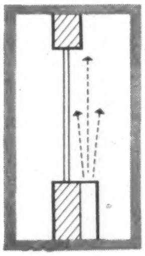
Herman Nelson DRAFT|STOP

Herman Nelson DRAFT|STOP* System Provides 100% Control At All Times That Drafts Exist

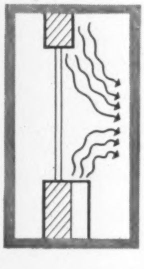
Chilling downdrafts from the typically large window areas of modern schools present a serious health and comfort problem. Those who specialize in school heating, cooling and ventilating systems recognize that these drafts must be controlled —but they approach the problem in different ways. Let's examine the three most widely used methods:

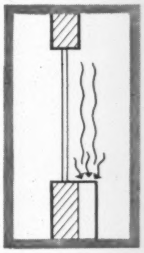


The Heat Barrier. With this method, a hot water or steam pipe (usually finned tubing) runs along the wall below the windows. Heat rising from this pipe is intended to warm the window area sufficiently to prevent drafts. Disregarding any other objections to this method, it has one serious deficiency: repeated tests have shown that occupied classrooms require cooling up to 70% of the time—even when outside temperatures are as low as 10° above zero. Obviously, when the unit ventilator is cooling, the hot water or steam supply pipe cools off. In many cases, this means that *there is no draft protection 70% of the time.* On the other hand, if heat is maintained in the wall piping at all times, it increases the cooling load with consequent fuel waste.



Another approach to the window draft problem uses a *Warm Air Curtain,* blown upward from louvers at the base of the windows. This warm air is secured by diverting some of the heated air from the unit ventilator. This system defeats its purpose for the same reason that the "heat barrier" fails. When the unit ventilator is cooling, there is a *cool* draft from the louvers. It meets the cold window downdraft and, since cold air tends to fall, both spill into the classrooms at shoulder level.





The Herman Nelson patented DRAFT|STOP system works on a completely different principle. It is not dependent upon heat in any way. DRAFT|STOP louvers extend along the window wall area. Cold window downdrafts are drawn into the louvers and returned to the unit ventilator. There, depending upon the heat requirements of the room, they are either warmed or mixed with fresh outdoor air and gently circulated. The DRAFT|STOP system controls window downdrafts 100% of the time because it does not depend on heat. When outdoor temperatures reach 60° or higher, window downdrafts do not exist. At all temperatures below that, Herman Nelson unit ventilators recirculate sufficient room air through the DRAFT|STOP window sill grille to trap downdrafts effectively.

In addition to controlling window downdrafts, the DRAFT|STOP method of recirculating room air has three other advantages:

1. Room air picked up at window sill level is cleaner than air drawn from the floor level.
2. Drawing air from the window level prevents ankle drafts caused by movement of air across the floor.
3. Where storage cabinets are desired, DRAFT|STOP is included at no additional cost.

Would you like more information on the famous DRAFT|STOP* system of classroom cooling, heating and ventilating? Ask your Herman Nelson representative or write to Herman Nelson Products, American Air Filter Company, Inc., Louisville 8, Kentucky.

*Patented—there are no substitutes.

AAF

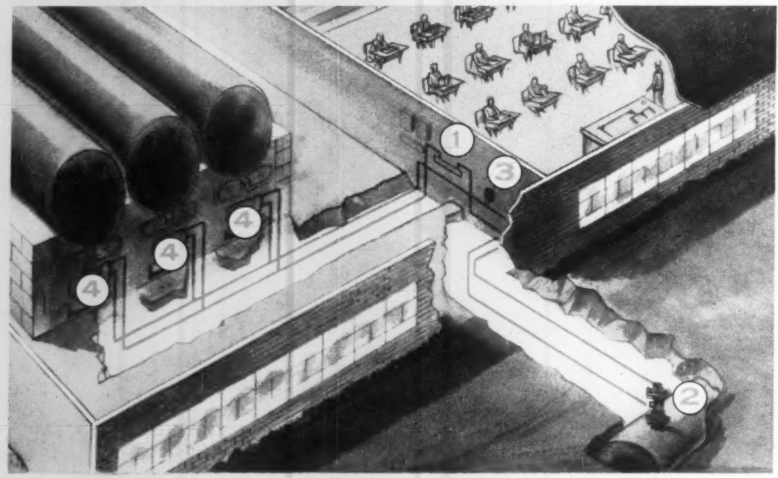
herman nelson

UNIT VENTILATOR PRODUCTS

American Air Filter Company, Inc.
System of Classroom Cooling, Heating and Ventilating

New Thermal Electric®
System solves heavy
fuel oil handling problems

LISTED UNDER REEXAMINATION SERVICE UL UNDERWRITERS' LABORATORIES, INC.



GUARANTEED PERFORMANCE

Thermal Electric System is guaranteed by Fluid Systems, Inc.:

- *To remove No. 5 or No. 6 fuel oil from storage without auxiliary heat in storage.*
- *To deliver the fuel oil to the connection provided by the manufacturer of each burner or boiler-burner unit, at not less than 120 degrees Fahrenheit under all conditions of flow, non-flow, intermittency of flow or rate of flow.*
- *After extended shutdown of pipe heating, to raise pipe and contents to design temperature.*

Thermal Electric takes the guesswork out of pre-heating and handling heavy oil. Fuel viscosity becomes a known, reliable factor since temperature is strictly controlled and hydraulics are predictable. In this pre-engineered system, controlled increments of 60 cycle, low voltage alternating current convert the pipe carrying No. 5 or No. 6 oil into a continuous low density heating element which maintains correct temperature level . . . even during long shutdown periods. Power consumption? For the average two-burner installation, the same as three or four 100-watt bulbs.

1. During burner operation, the excess return oil from the burner is sent through the Thermal Electric Immersion Heater. **2.** In the Thermal Electric Tank Unit the warm return oil (170°-200°F.) is mixed with cold oil from storage (50°-60°F.) to produce 120°F. suction line temperature. **3.** The Thermal Electric Energizer, connected directly to the oil lines, provides controlled increments of low voltage 60 cycle alternating current which maintains the oil at 120°F. (300 SSF.) from the tank to the burners. **4.** Even after prolonged shutdown, the oil at the burners is always at the correct temperature for a clean and safe automatic start-up.

More detailed information is contained in our new 20-page handbook. Also available is UL report MP 2047. Send for your free copy today.

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☐ 20-page handbook on Thermal Electric
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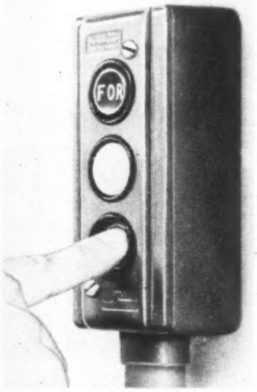

cover molded of glass fiber reinforced alkyd. Control mechanism can be removed from base by loosening two screws.

Gas Pointer . . .

. . . for detecting, measuring natural gas concentrations—*Johnson-Williams, Inc., Dept. HPAC,* 2715 *Park Blvd., Palo Alto, Calif.*

Portable unit measures in two ranges, 0-1.0 lower explosive limit, 0-100 percent actual gas concentration. Features cited: light glass fiber case, convenient shoulder strap, printed circuits.

AMPROBE
40
30
20
10
0

Ammeter . . .

. . . with 300 volt scale — *Pyramid Instrument Corp., Dept. HPAC, Lynbrook, N. Y.*

Designed to provide greater accuracy for measuring lower voltages. "RS-2 Amprobe" also has 150 volt range, four current ranges — 5, 15,

Where Do Great Ideas Come From?

From its beginnings this nation has been guided by great ideas.

The men who hammered out the Constitution and the Bill of Rights were thinkers—men of vision—the best educated men of their day. And every major advance in our civilization since that time has come from minds *equipped by education* to create great ideas and put them into action.

So, at the very core of our progress is the college classroom. It is there that the imagination of young men and women gains the intellectual discipline that turns it to useful thinking. It is there that the great ideas of the future will be born.

That is why the present tasks of our colleges and universities are of vital concern to *every* American. These institutions are doing their utmost to raise their teaching standards, to meet the steadily rising pressure for enrollment, and provide the healthy educational climate in which great ideas may flourish.

They need the help of all who love freedom, all who hope for continued progress in science, in statesmanship, in the better things of life. And they need it *now!*

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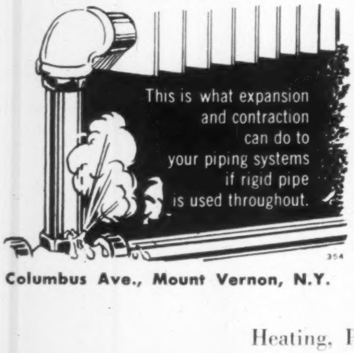


PACKLESS
METAL HOSE INC. 730-12 So. Columbus Ave., Mount Vernon, N.Y.

EQUIPMENT DEVELOPMENTS

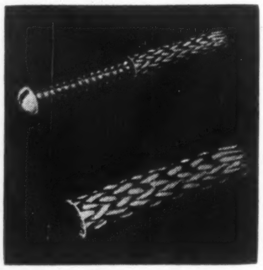
Continued

40, 100 amp — each on separate scale. Range selector permits choice of any range. Other features cited: magnifying glass covered dial, long needle sweep, "pointer lock" to lock needle in place when operating in difficult location.

Portable Drill . . .

. . . for drilling anchor holes for installation of piping — *Truco Water Swivel Div., Wheel Trueing Tool Co., Dept. HPAC, Detroit 38.*

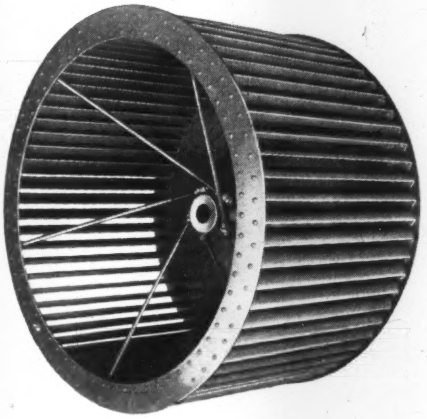
Unit weighs 7½ lb, uses diamond drills to 1¾ in. OD for high speed drilling in concrete, ceramic tile, granite, marble, etc., says company. Motor operates at 2500 rpm with integral swivel which supplies water to diamond bit to flush away cuttings. Equipment with drill includes 10 ft of electric cable, 10 ft of water hose, steel carrying case.



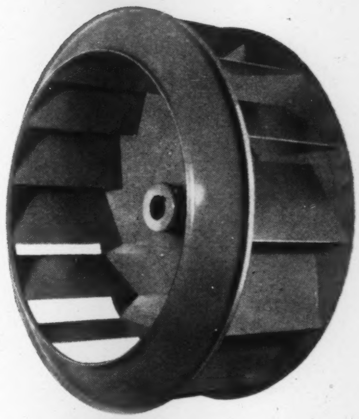
Screw Anchors . . .

. . . with lead alloy cores — *Rawlplug Co., Dept. HPAC, New Rochelle, N. Y.*

"Rawloy" cores provide more ef-

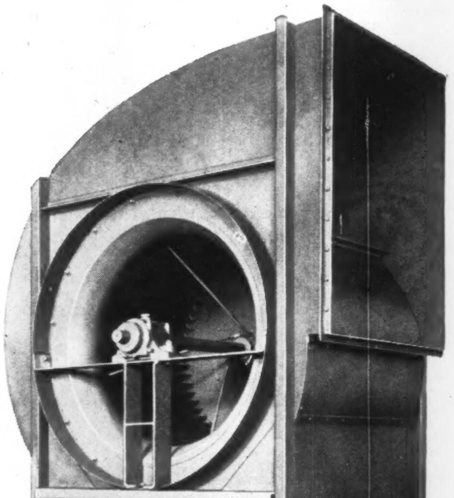


The Sirocco Wheel—Designed with a multiple number of narrow, curved blades, forward pitched. Operating at low rotative and peripheral speeds, it delivers more air per revolution than any other type of fan.



The HS Wheel—Medium-speed wheel with true non-overloading power characteristic; features large-area die-formed blades, mounted in backwardly inclined position between heavy-duty backplate and streamline rim.

Match the wheel to the job . . . with rugged, quiet American Blower Sirocco and HS Fans!



American Blower fans have Certified Ratings for dependable performance.

American Blower's complete line of fans lets you match the wheel to the duty, whether it's ventilating, air conditioning, heating; or drying, fume-removal, and processing systems. Their heavy-duty design and construction assure you of long fan life with a minimum of maintenance. Take the Sirocco and HS fans, for example:

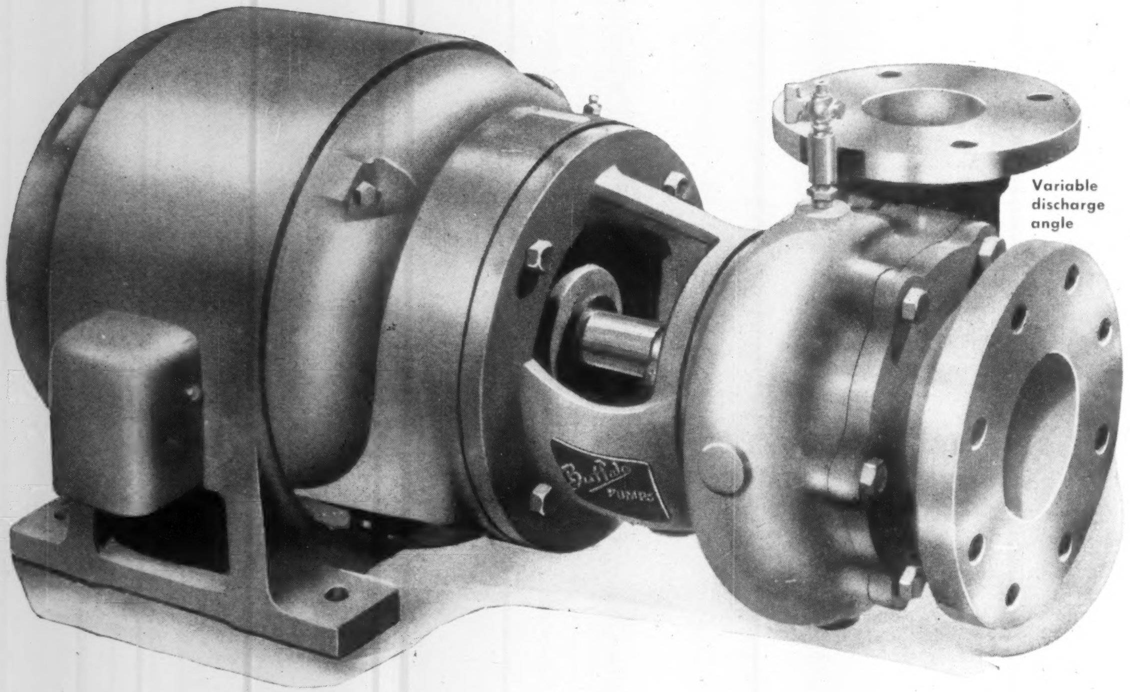
Sirocco and HS fans offer smooth, quiet air delivery, high operating efficiency and dependable service. They are available in 25 standard sizes from 12¼" to 132" wheel diameters for volumes to over 700,000 CFM.

Precision-built Sirocco and HS fans can be specified in single or double inlet and in any of eight standard discharges, with ball, roller or sleeve bearings as required. Inlet vanes, dampers or Gýrol Fluid Drive can be furnished to meet volume control requirements. Larger sizes are designed so that they can be dismantled for easy handling in shipment, erection and maintenance.

Get details on the complete line of American Blower fans. Call our nearest branch office; or write direct to American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

AMERICAN BLOWER

Division of **American-Standard**



Variable discharge angle

Easily mounted, horizontal or vertical

No shaft alignment problem on installation or later

Rugged Solid Shell

Removable side plate

SMALL SIZE – BIG PERFORMANCE –FLEXIBLE INSTALLATION

These husky, compact pumps fit into cramped quarters with ease and deliver big-pump performance with a minumum of installation and service time.

"Buffalo" Close-Coupled Pumps have permanently aligned shafts plus adjustable discharge angle, affording wide flexibility in mounting and piping. And beyond these advantages, they're built for the reliability and efficiency inherent in all "Buffalo" Pumps — with deep, 8-ring stuffing boxes — oversize shafts — sturdy casings with passages offering minimum friction — overall solidity and strength — and the well-known efficient "Buffalo" impellers.

For many clear water services, including chilled water, "Buffalo" Close-Coupled Pumps are the logical choice for yourself and the customer. Write for Bulletin 975-D for a check on sizes, specifications and performance.

"BUFFALO" CLOSE-COUPLED PUMPS FOR CLEAR WATER **1" to 6" sizes** **10 to 1100 gpm**
Up to 360-ft. head (300 gpm)

"Buffalo" PUMPS

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Division of Buffalo Forge Co.
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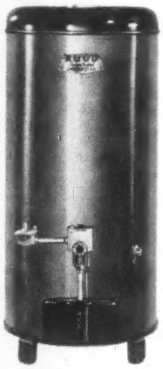
Canada Pumps, Ltd., Kitchener, Ont. *Sales Representatives in all Principal Cities*

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID fective lubrication for faster installation, prevent fibers from being cut by screw threads, company says. Fiber jute construction is said to allow anchors to be used in any material, absorb continuous shock and vibration.



Gas Water Heater . . .

. . . designed for use with natural, mixed, manufactured, LP gases featuring copper-nickel alloy tank — *Ruud Mfg. Co., Dept. HPAC, Kalamazoo, Mich.*

"CST 80-80" can be installed singly or in multiple for single or two temperature operation. Unit has recovery rating of 80 gal per hr at 100 F deg temperature rise; furnishes both 140 and 180 deg "sanitizing" hot water. Tank capacity is 67 gal.; input is 95,200 Btu per hr.

Paint System . . .

. . . formulated for air conditioning equipment, components—*Arco Co., Dept. HPAC, 7301 Bessemer Ave., Cleveland 27.*

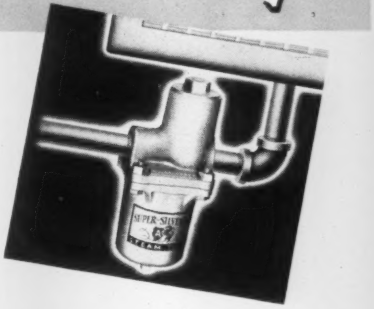
Exterior parts fabricated from galvanized steel many now be offered in colors which will remain in excellent condition, company says.

Adhesive . . .

. . . for binding Teflon to variety of materials—*Flexrock Co., Dept. HPAC, 36th and Filbert Sts., Philadelphia 4.*

Will peel strength of more than

TURN UP the HEAT!
BY TURNING TO
Super-Silvertop!

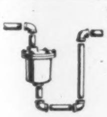


If you were plagued last winter by calls to "turn up the heat" in your plant, it's time to plan ahead for this year's icy temperatures. Super-Silvertop Steam Traps can increase the efficiency of your steam heating system, and save hundreds of dollars in fuel bills. Whatever type of steam system you have, unit heater, pipe coil, fan system, or any other, you'll find Super-Silvertops will vent the air and drain condensation rapidly, allowing the heater to reach full operating efficiency almost instantly.

Make your steam heating system give you your money's worth. Replace your obsolete traps with Super-Silvertops. Reduce corrosion, get faster heat, save on fuel bills, and enjoy a warm, comfortable plant the year 'round with Anderson Super-Silvertop Steam Traps. See your jobber or Anderson Sales agent today!

ANDERSON SUPER-SILVERTOP STEAM TRAPS
the Engineered Steam Traps!

THE NEW WAY
Notice the simplicity and savings in fittings.



THE OLD WAY
Notice how bottom inlet requires complicated piping.

Free Trap Selector Booklet!

Tells how to select and install traps for all steam equipment. For your free copy, fill out and mail this coupon to:

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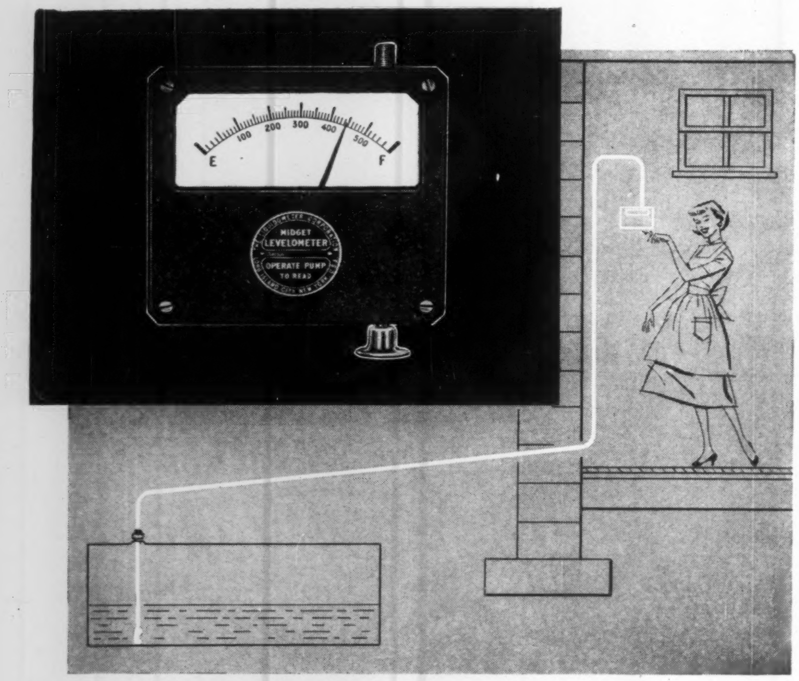

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GIVE DEPENDABLE INDICATION OF TANK CONTENTS

Midget Levelometers provide home owners and plant engineers with reliable, easy-to-read, trouble-free indication of fuel supply. The dangers and inconvenience of old-fashioned dip sticking and taping methods are eliminated. In the plant, fire and labor hazards are cut . . . costly shut-downs caused by lack of fuel are avoided.

Levelometers operate on an adaptation of the hydrostatic principle. They establish a balance between the height of the liquid to be measured and an indicator. Dial type indication provides maximum readability. Levelometers are precision built, rugged, easy to install and constructed of the finest materials. Approved by UL, FM and BSA, New York, they are used for gaging fuel oil, diesel oil, gasoline and a variety of other liquids.

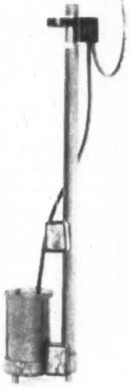
Levelometers are available in several sizes for a wide variety of applications. For complete information write Dept. A

THE LIQUIDOMETER CORP.
SKILLMAN AVENUE AT 36TH STREET, LONG ISLAND CITY 1, N. Y.

EQUIPMENT DEVELOPMENTS

Continued

1000 grams per in. or direct pull of 12 to 15 psi, company says. Has acid, alkali resistance, electrical properties. Can be applied by brushing, dipping, spraying. Known as "Flexrock No. 80," is available in small quantities.



Sump Pump . . .

. . . with remote switch mounted on discharge pipe above pump, clear of water area — *Piqua Machine & Mfg. Co., Dept. HPAC, Piqua, Ohio.*

New position of switch permits easy installation, adjustment, servicing, company says. Complete unit designed to serve as drainer, waste water disposal pump, bilge pump, etc.

Calculator . . .

. . . for obtaining figures needed in heating estimates—*Radiant-Ray Radiation, Inc., Dept. HPAC, 464 Hartford Ave., Newington, Conn.*

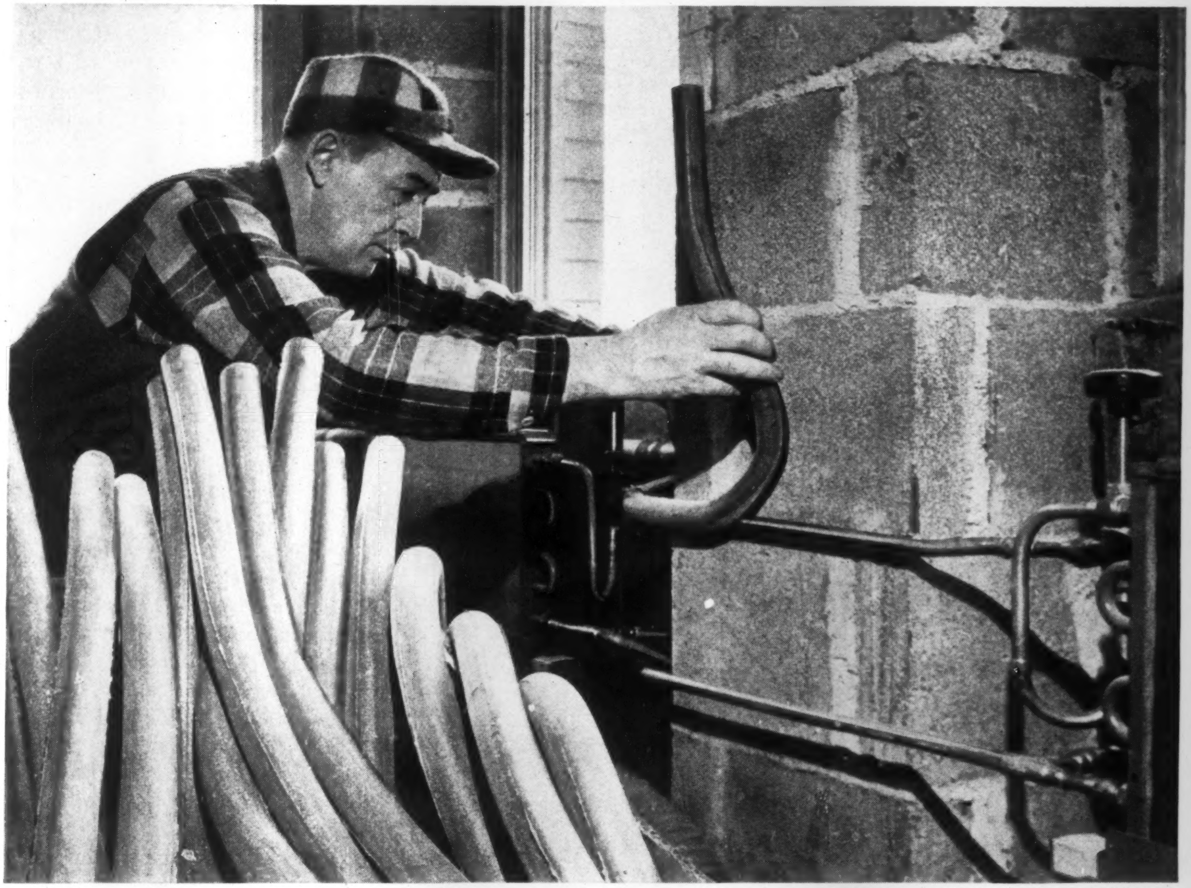
Calculator operates on slide rule principle so that readings can be taken at nine openings. Computes gross wall, window, door, ceiling, floor areas; room volume. Shows commonly used heat loss factors, infiltration factors.

Drill Attachment . . .

. . . designed to drill into all types of masonry—*Ideal Industries, Inc., Dept. HPAC, 1096 Park Ave., Sycamore, Ill.*

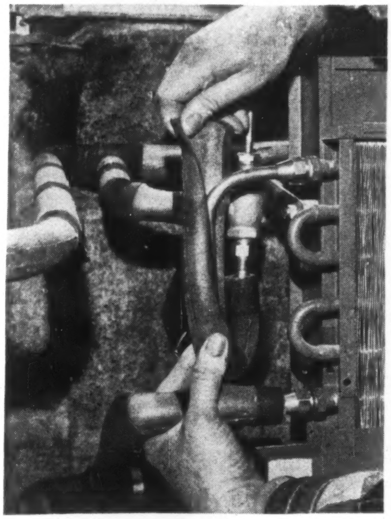
Attachment inserts into 1/4 in. drill

B.F.Goodrich



Mr. Cabasin of Asbestos Construction Company

Cell-Tite® Insulation does good job on odd job



"To insulate tubing already installed, we required a material that could be applied without pre-forming or complicated fastenings to bends, elbows, Tee-joints and valve seats.

"Our answer was B. F. Goodrich Cell-Tite," said Joe Cabasin of Asbestos Construction Company, insulation contractors on a 31-story office building at 425 Park Avenue, New York.

"We used over 35,000 feet of Cell-Tite to insulate against both hot and cold water condensation and temperature loss in the dual Carrier 'Weathermaster' air conditioning system. And, we got increased ease of application, plus the simplicity and interchangeability we needed for rapid completion. Even with clearances of 2" or less, Cell-Tite gave us complete flexibility.

"With easy-to-install Cell-Tite, a new man fits insulation at the end of his first day, as fast as an old hand. And, in spite of simplicity of application, Cell-Tite supplies the permanence we need.

"Since the insulation had to be applied after the tubing was installed, the pipe coverer has to work in awkward places, reach into hidden areas. With Cell-Tite, all he does is slit it, slip it on, and tape it. Cell-Tite really does the job!"

In important buildings all over the world, B. F. Goodrich Cell-Tite is there. Write for your free booklet . . . complete information on Cell-Tite tubing, cord and strip insulation. It's B. F. Goodrich Sponge Products, a division of The B. F. Goodrich Company, **381** Derby Place, Shelton, Connecticut.

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SPONGE PRODUCTS

THE NEXT MEDICAL MILESTONE

. . . CONQUEST OF CANCER?

In a few short years we've seen the discovery of antibiotics, new wonder drugs for tuberculosis, a vaccine for polio. We will see the conquest of cancer, too, if people want it badly enough. Last year the American Cancer Society was unable to fill requests for research funds totalling almost $3,000,000. The reason—not enough money. Did you give all you could? Will you give all you can?

AMERICAN CANCER SOCIETY ®

EQUIPMENT DEVELOPMENTS

Continued

chuck. Inner cam action gives bit hammer-like blow every half revolution, company says. Weighs 20½ oz, adds 4¾ in. to length of electric drill. Available in sizes 3/16 in. to 1 in.

BACHARACH
VOLTS
AMPS
LOW PRESSURE SWITCH
PITTSBURGH 8, PA.
+
−

Switch . . .

. . . for control lines and signaling small pressures, vacuums or differential pressures—*Bacharach Industrial Instrument Co., Dept. HPAC, 200 N. Braddock Ave., Pittsburgh 8.*

Unit controls movement of roll type air filters, regulates pressure of gas boosters. Designed also for switch operation of dampers, blowers, gas fired heaters and similar low pressure control, safety, signaling applications. Can be mounted in various positions. Normal range is 0.1 to 5.0 in. water.

Cable Connection Support

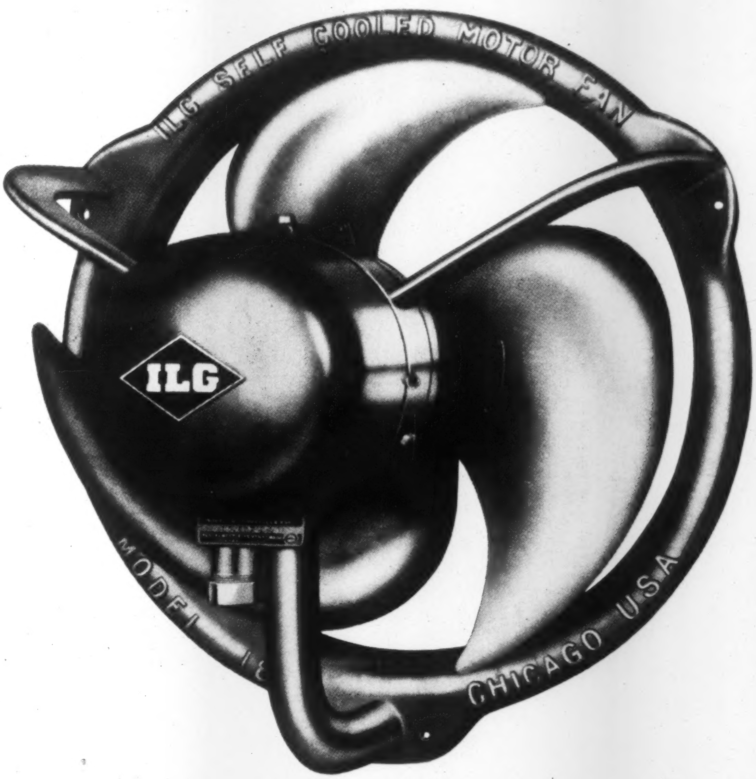
. . . designed to eliminate welding cable strand breakage at electrode holder connection—*Tweco Products Co., Dept. HPAC, Boston at Mosley, Wichita 1, Kan.*

Steel clamp anchors in electrode holder connection socket extends back to encircle, grip rubber jacket of cable behind bare strands. Units made of zinc plated steel.

Condensing Units . . .

. . . in ¾ to 2 hp range—*Lehigh Mfg. Co., Dept. HPAC, Lancaster, Pa.*

Lightweight, high capacity units



Ilg **Propeller Fans** run cool, stay clean. **Ilg's direct-connected motor—with permanently lubricated ball bearings—cools itself with outside air whenever the fan is in operation.** Quiet, smooth, free-running action **is assured by dynamically balanced fan wheel that stays in alignment. No belts or pulleys to wear out... power costs cut up to 10%... Ilg fans** cost less in the long run. PFMA label **certifies air capacity ratings.** The Man from Ilg **can help you choose the right size—from 6" to 72". Whatever your ventilation problem, plan to talk it over with The Man from Ilg.**

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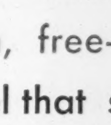
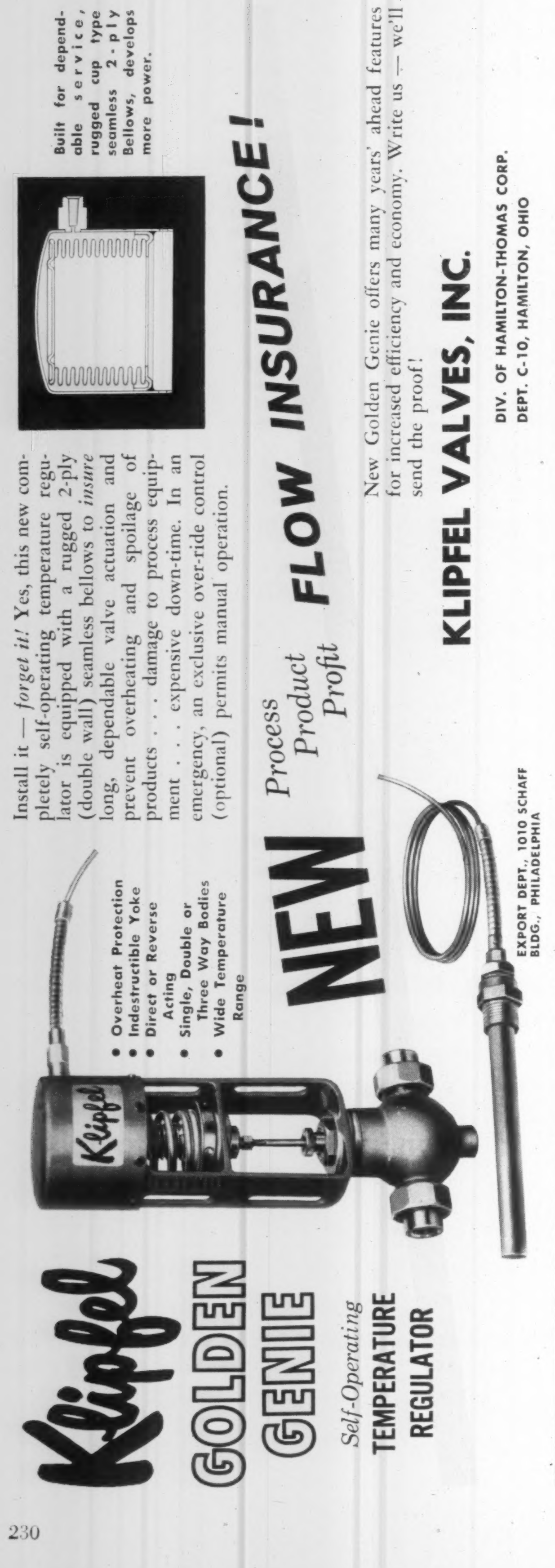
Here is practical engineering data for your files . . . the "how's" and "why's" of industrial ventilation . . . types and capacities of equipment recommended for various situations . . . information and diagrams on installation. 30 pages.





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Self-Operating
TEMPERATURE REGULATOR

- Overheat Protection
- Indestructible Yoke
- Direct or Reverse Acting
- Single, Double or Three Way Bodies
- Wide Temperature Range

NEW *Process Product Profit* FLOW INSURANCE!

Install it — *forget it!* Yes, this new completely self-operating temperature regulator is equipped with a rugged 2-ply (double wall) seamless bellows to *insure* long, dependable valve actuation and prevent overheating and spoilage of products . . . damage to process equipment . . . expensive down-time. In an emergency, an exclusive over-ride control (optional) permits manual operation.

Built for dependable service, rugged cup type seamless 2-ply Bellows, develops more power.

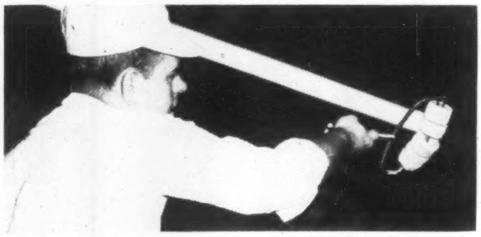
New Golden Genie offers many years' ahead features for increased efficiency and economy. Write us — we'll send the proof!

KLIPFEL VALVES, INC.

DIV. OF HAMILTON-THOMAS CORP.
DEPT. C-10, HAMILTON, OHIO

EXPORT DEPT., 1010 SCHAFF BLDG., PHILADELPHIA

offered in air cooled, water cooled models for high, medium, low temperature applications. Designed for use with fluorinated hydrocarbon refrigerants 12, 22. All feature reciprocating design for quiet performance, company says.



Paint Roller . . .

. . . designed to "wrap around" pipes, utility poles, other cylindrical objects—*E Z Paintr Corp., Dept. HPAC, Milwaukee.*

"E Z Pipe Paintr" can be used on practically any size pipe or similar object, company says. Large size consists of five separate paint rollers operating on spring. When slight hand pressure is released, roller returns to original starting shape for loading in paint tray.

Nameplates . . .

. . . used to identify, instruct, inform—*W. H. Brady Co., Dept. HPAC, 727 W. Glendale Ave., Milwaukee 9.*

Plates adhere to metal, glass, plastic, wood, painted, smooth, flat, wrinkled, curved surfaces. Require no activation by water, solvent or heat, company says. Made from 0.004 in. aluminum, backed with "Permabond" pressure sensitive adhesive. Available in wide range of colors, both glossy and matte finish.

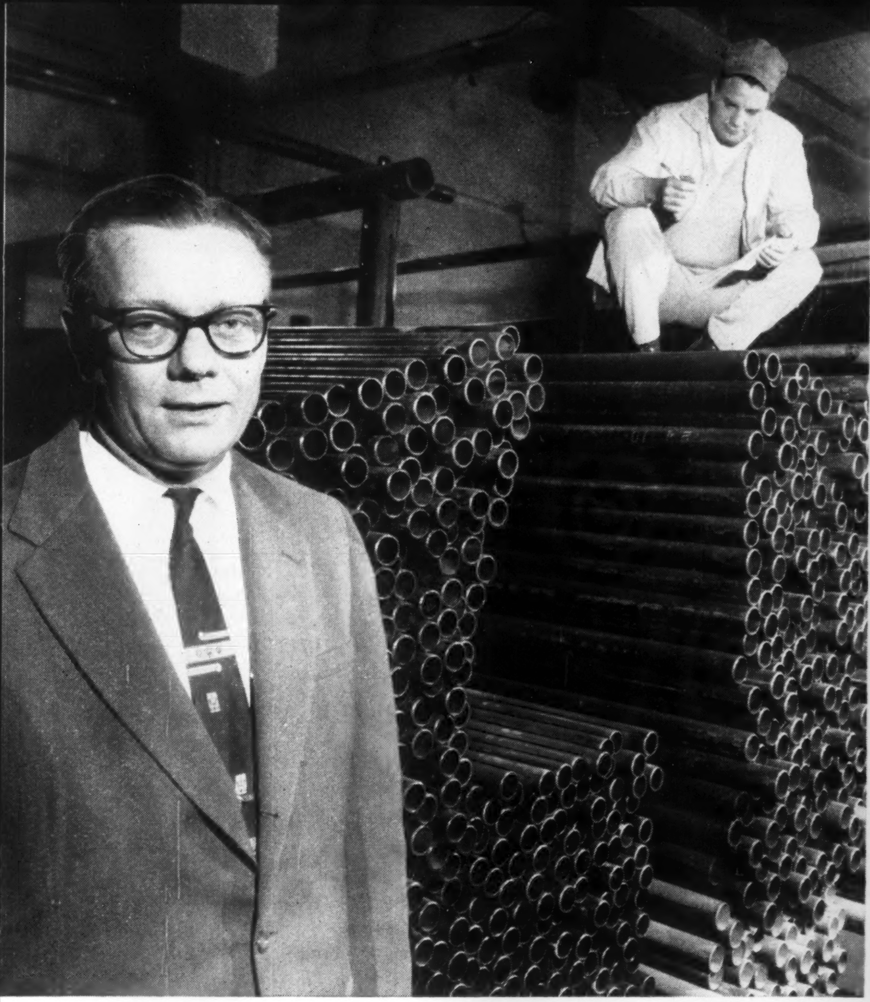
Vertical File . . .

. . . designed to hold 700 small blue prints to 24 in. × 36 in. in size—*Momar Industries, Dept. HPAC, 4319 W. 32nd St., Chicago.*

"Glider" small print file constructed of heavy gage steel, 24 × 24 × 48 in. Contains seven print retainers, utilizes clamp design that excludes need for punched holes in prints, says company.

Wire Brushes . . .

. . . for use as tube cleaners, turbulators, stirrers, heat exchangers, static eliminators, power brushes—*Mill-Rose Co., Dept. HPAC, 1985 E. 59th St., Cleveland 3.*



Lee C. Oliver reports that Daniel J. Keating Company's Sprinkler Division has used SPANG Pipe exclusively for three years. Because Spang is so easy to work with, all jobs are ready-made at the shop, and assembled at job site.

LITS LITS
Lit Brothers

SPANG Pipe sprinkler system protects the Lit Brothers Camden Branch store and merchandise. System uses 30,000 ft. of pipe.

Low-hung ceiling panels hide sprinkler pipes; only the sprinkler heads show through. Total store area is approx. 150,000 sq. ft.

SPANG® CW pipe consistently delivers top-quality performance in sprinkler installations

says Mr. Lee C. Oliver, Manager, Sprinkler Division, Daniel J. Keating Company, Philadelphia

"We've been using Spang CW Steel Pipe exclusively for three years," states Mr. Oliver. "Our experience has been that Spang Pipe resists corrosion, vibration and the rough handling which every pipe undergoes during installation. It's easy to cut and thread, permitting us to prepare ready-made systems in the shop for assembly at job sites."

The SPANG sprinkler installation at Lit Brothers, Camden, N.J.

"We installed 30,000 ft. of Spang Pipe at the new Camden (N.J.) Branch of Lit Brothers department store. The system set to go off at 165 F, is in operation at all times at pressures from 90 psi to 125 psi, and protects the building and merchandise.

"Upon completion of the installation, we tested the system at 200 psi for two hours, since any failure later on would be disastrous. But we have never run into a pipe failure on any Spang Pipe installation."

SPANG delivers top-quality every time!

Quality Control makes the big difference. Spang CW Steel Pipe is carefully controlled during manufacture, and is rigidly tested and inspected prior to delivery to assure you of a *top-quality* product for every type pipe installation.

Try Spang Pipe on your next job. You'll get *top-quality* service from your Spang Distributor, too!

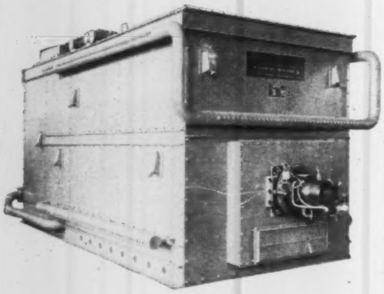
Architect: Thalheimer & Weitz, Philadelphia
General Contractors: Baton Construction Corp., Philadelphia
Spang Distributor: J. Levitt, Inc., Philadelphia

SPANG-CHALFANT
DIVISION OF THE NATIONAL SUPPLY COMPANY
General Sales Offices: Two Gateway Center, Pittsburgh, Pa. District Sales Offices: Atlanta, Boston, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis

SPANG CW® STEEL PIPE

for Heating
MULTIPLE BUILDINGS
LARGE SINGLE BUILDINGS

High Temperature Water



is
Cheaper
with

International-LaMont
FORCED RECIRCULATION
GENERATORS

Why? Because International-LaMont HTW Generators give you more in terms of dependable performance, higher efficiencies and significant operating economies. Featuring forced recirculation plus a built-in counterflow economizer, International-LaMont HTW Generators permit temperature differentials between outgoing and return water of up to 200°F. with attendant savings throughout the system. The return water is preheated by flue gases BEFORE reaching the radiant furnace zone—eliminating the danger of thermal shock.

These are only a few of the distinct advantages that make International-LaMont the leading name in high temperature water generation.

International-LaMont
FORCED RECIRCULATION GENERATORS
THE INTERNATIONAL BOILER WORKS CO.

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Write for Bulletin 700 today.

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BOILER BUILDERS SINCE 1886

THE INTERNATIONAL
BOILER WORKS CO.

810 Spruce St.
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Steel Firebox Heating & Power Boilers
Low & High Pressure Water Tube
Package Boilers • International-LaMont Forced Recirculation Generators • ASME Code Pressure Vessels & Welded Products.

EQUIPMENT DEVELOPMENTS

Continued

Brushes may have single or double spirals of bristles; fill material may be hog bristle, fiber, nylon, steel, brass, bronze, stainless, etc. Available to 8 ft in length with brush diameters 1/4 to 8 in.

HF STABLE-DYNEL OVERLAY

Felt . . .

. . . for use as overlay material—*American Felt Co., Dept. HPAC, Glenville Rd., Glenville, Conn.*

Recommended by company to upgrade low pressure laminated glass mat structures such as ducts, hoods, pickling tank covers, linings, etc. Felts give smooth, uniform surface because of resin-to-fiber bonds, lack of fiber migration to surface, company says. Inherent properties designed to resist chemical action.

Insulated Panels . . .

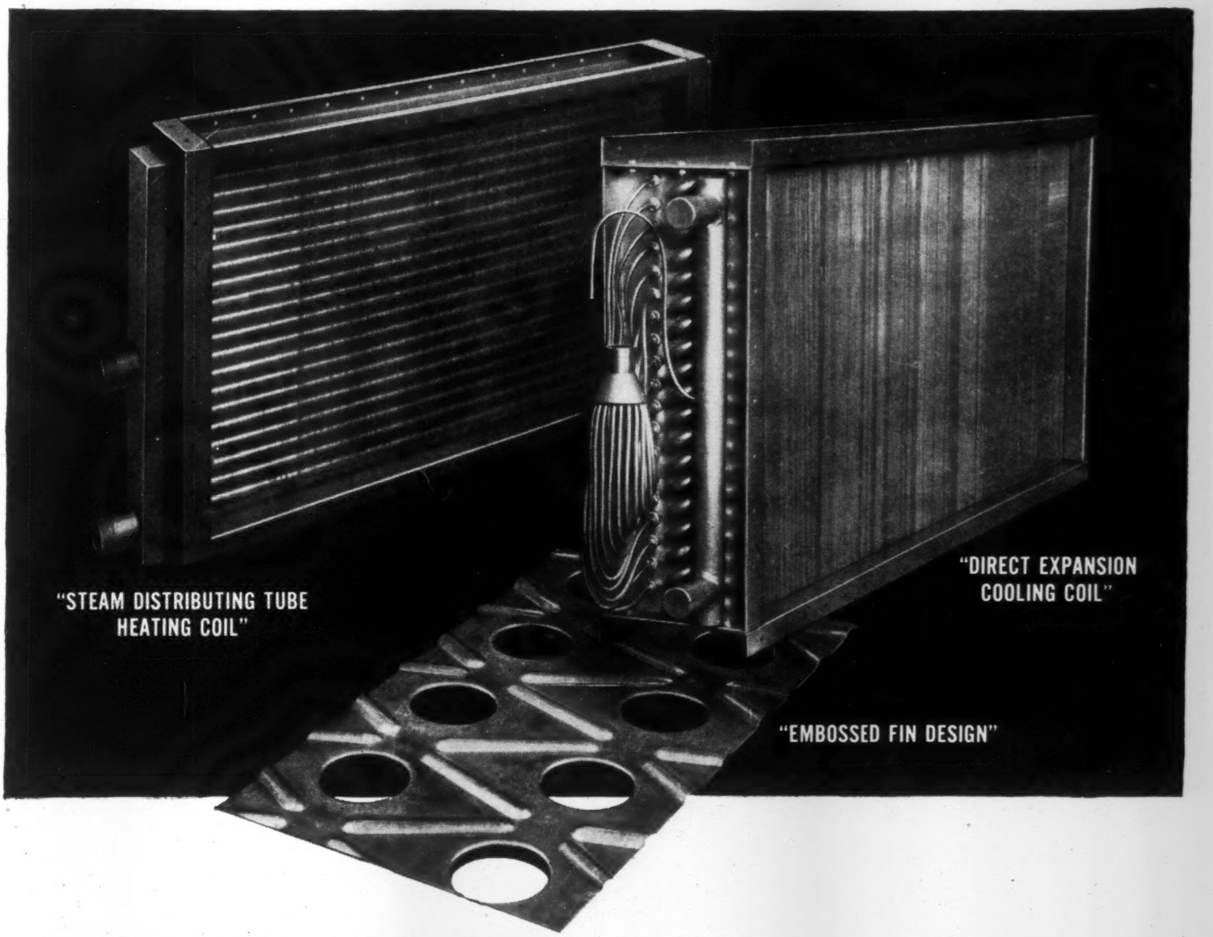
. . . constructed of foamed plastic, ready for fabrication—*Aluminum Co. of America, Dept. HPAC,* 1501 *Alcoa Bldg., Pittsburgh* 19.

Panels come in widths to 48 in., thicknesses to 6 in. Tubing, for conduit purposes, heating, cooling, can be placed in core material while panels are in production. Filling of panels moistureproof, odorless, company says.

Metering Floats . . .

. . . designed to provide interchangeability, predictability of performance—*Brooks Rotameter Co., Dept. HPAC, Lansdale, Pa.*

Technical improvements in design permit one float to be used in any


"STEAM DISTRIBUTING TUBE HEATING COIL"
"DIRECT EXPANSION COOLING COIL"
"EMBOSSED FIN DESIGN"

DEAD AIR IS A DUD... *and a costly one!*

Dead-air film on smooth fin surface prevents maximum heat transfer!

GET PURCHASED PERFORMANCE! . . . Use Westinghouse Heat Transfer Surface with its air-activating fin design—prevents dead-air film!

All Westinghouse Continuous Plate-fin Coils feature:

- **Embossed Fin design—Maximum Heat Transfer**
- **Permanent Mechanical Bond—Fin to Tube**
- **Minimum Air Resistance**
- **Guaranteed Published Performance**
- **Wide Selection—For Heating and Cooling**

And for Heavy Duty—Industrial-Process and High-Pressure applications . . . standard sections with extra-heavy wrought iron finned pipe!

Call your Sturtevant Division Sales Engineer for complete details on your heating and cooling coil requirements, or write Westinghouse Electric Corporation, Department AC K-2, Hyde Park, Boston 36, Massachusetts.

J-80635

WESTINGHOUSE AIR HANDLING

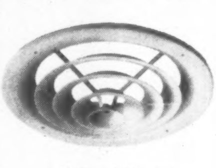
YOU CAN BE SURE... IF IT'S Westinghouse

REGISTERS ARE THE SHOWPIECES OF THE JOB!

You use great care in the engineering and installation of your heating and air conditioning equipment. Yet most of the items are hidden from the homeowner's view—in the attic, closet or basement.

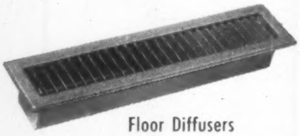
Only the registers are in plain sight in every room in the home at all times. So it is important to be sure the registers reflect the true quality of the installation. These "showpieces of your job" should not only be better in design and performance, but also superior in beauty and strength.

That's why selling Lima Registers to your prospects will actually help you sell more complete heating and air conditioning jobs. Ask us for the Lima Quality and Performance Story. It will help you make more sales.

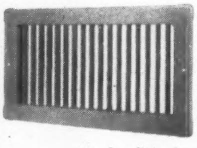


Ceiling Diffusers

Baseboard Diffusers



Floor Diffusers



Air Conditioning Grilles, Valves

Lima REGISTER COMPANY
1796 N. Cable Rd. Lima, Ohio

sold exclusively through wholesalers and manufacturers

EQUIPMENT DEVELOPMENTS

Continued

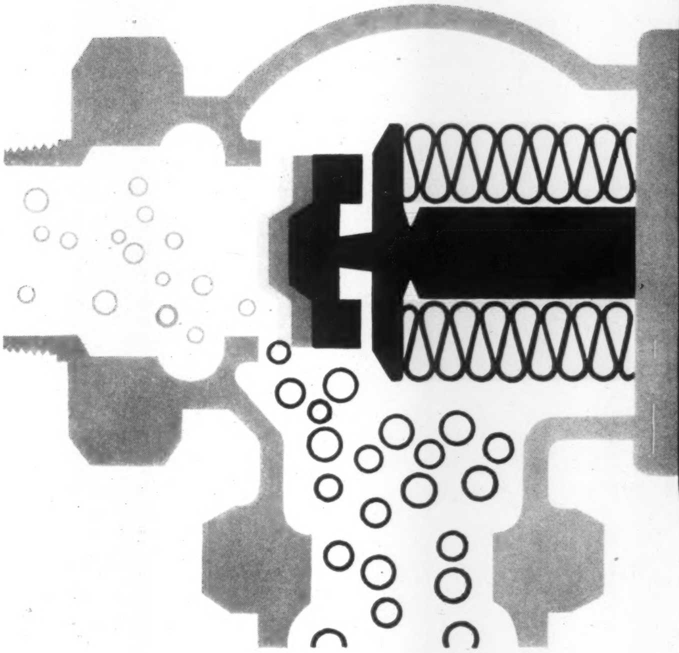
application from common flow indication to remote pneumatic, electric transmission, alarm functions, company says. Floats used in company's "Full-View" rotameters.

Equipment Briefs . . .

WATER PRESSURE ANALYZER KIT designed to solve field problems dealing with pressure, flow rates — *F. E. Myers & Bros. Co., Dept. HPAC, 249 S. Orange St., Ashland, Ohio.* Kit includes brass adapter coupling, street tee, bushing, pressure gage, three flow control regulators, hose fittings, gasket. Regulators are in 2½, 4, 6 gpm sizes. Pressure drop across water conditioner, water carrying capabilities of piping systems, pump performance, locating obstructions in piping systems, checking water system's ability to backwash water conditioner made possible by use of the kit, company says.

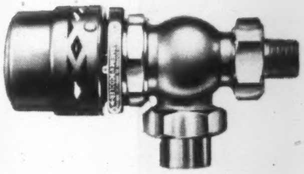
PACKAGED AIR CONDITIONERS for commercial use — *Drayer-Hanson, Div. of National-U.S. Radiator Corp., Dept. HPAC, 3301 Medford St., Los Angeles 63.* Units equipped with matched coil, condenser, compressor units in 2, 3, 5 ton ratings. Free blow or duct units —air or water cooled—available. Four-way air deflection grille, front door permit air discharge in all directions; provide air circulation in built-in plenum. Equipped with hermetically sealed compressors, are life time lubricated, manufacturer states.

AIR CONDITIONERS in new 1958 models — *Fedders-Quigan Corp., Dept. HPAC, 57 Tonawanda St., Buffalo 7.* Heat pump unit can be used regardless of the temperature prevailing outdoors, company says. Another is 1½ hp model designed to operate on 115 volt current. "WeatherRobot" control system incorporates new thermostat which senses when coil begins to frost and



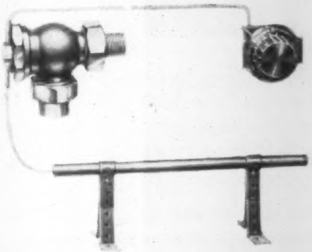
Anyone can afford room temperature control the Fulton Sylphon way

With Fulton Sylphon Automatic Radiator Valves, individual room temperature control is practical and economical for any building heated by steam or hot water radiation systems. First off, this type of control costs less than most. Your installation costs are lower because there is no electrical wiring, piping, or accessory equipment. Owner operating costs are lower because these self-operated valves require no outside source of power. And unlike "on-off" controls, they *throttle* heat input *continuously*. This action not only conserves the heat supply medium, but also keeps rooms from alternating between "boiling hot" and "stone cold."



FOR EXPOSED RADIATORS

No. 885 Automatic Radiator Valve is not only self-powered, but also self-contained so that it simply installs in place of the hand valve. For either steam or hot water systems. A turn of the valve head sets it to maintain any temperature between 60° and 75° F. Packless valve eliminates maintenance problems. ½'', ¾'' and 1'' valves. No. 885 Valve can also be used with convectors and finned pipe.



CONVECTORS · CONCEALED RADIATORS

The No. 895 Automatic Radiator Valve is designed especially for the regulating and installation requirements of enclosed steam, vapor or vacuum units. Only the control knob shows. Adjusts instantly for any temperature from 40° to 90° F. Valve is packless . . . no packing replacement problems. Valve sizes ½'', ¾'' and 1''. Fulton Sylphon offers Model No. 522-A for hot water installations.

SEND FOR CATALOG BULLETIN TH-80

Mr. Controls

Robertshaw-Fulton

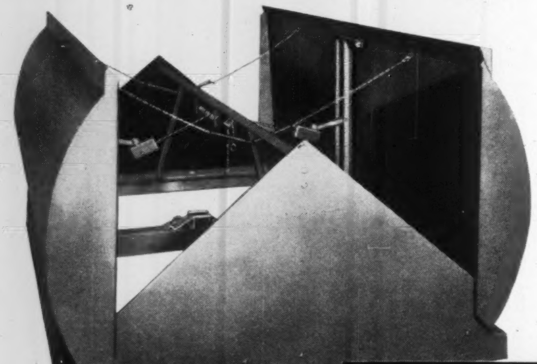
CONTROLS COMPANY

FULTON SYLPHON DIVISION · Knoxville 1, Tennessee

Keep your fire loss Down

with the efficient new

Swartwout Pyrojector



. . . ejects smoke and heat out through plant roof . . . reduces fire **spread** . . . guides firemen to fire source.

Pyrojector is an effective answer to fires that billow up and spread under closed roofs. It opens a 28 square foot draft-fed escape vent for smoke and flames. Heat at 212° F. melts a fusible link — releases powerful spring force that opens dampers instantly.

This is a completely new design, with unusual features. Low contour (only 29″ above curb), neat appearance. Installs and operates *entirely above roof level.* Spot it over most likely fire sources, singly or in groups. Or alternate with roof ventilators. Weatherproof when closed. Can be opened for extra ventilation in dry weather. Dampers are double wall construction, insulated. Release mechanism is rugged, positive.

For complete details of this new "escape" ventilation unit, write today for Form 701-F.

The Swartwout Company, 18511 Euclid Ave., Cleveland 12, Ohio

Swartwout ROOF VENTILATORS AND VENTILATING LOUVERS

ALSO AUTRONIC PROCESS CONTROL EQUIPMENT

EQUIPMENT DEVELOPMENTS

Continued

turns air conditioner from heating cycle back to cooling in order to defrost coil, manufacturer says. During defrosting cycle, blower fan is automatically turned off so that cold air is not circulated within room.

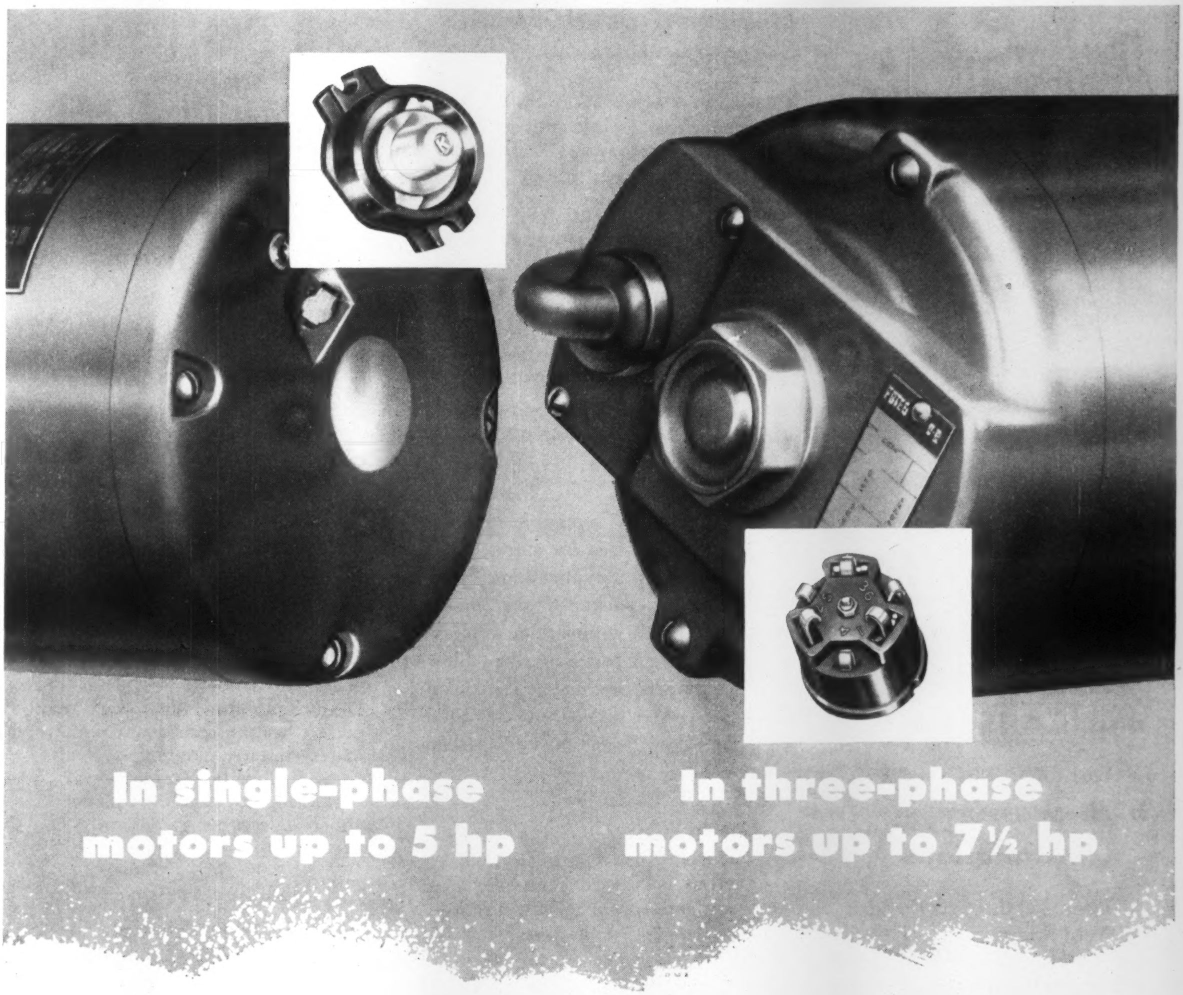
COMPUTER for adding, subtracting — *Alexander Drafting Equipment Co., Dept. HPAC,* 423 *S. Chester Ave., Pasadena, Calif.* "Fractomator" totals to 100,000. Use of decimal columns in conjunction with two extra columns—one divided in inches, another in fractions of an inch as low as sixteenths—allows addition and subtraction of dimensions expressed in feet, inches, fractions, company says. Units come in pocket sizes, desk models.

ADHESIVE for adhering polyethylene to polystyrene foam — *Adhesive Products Corp., Dept. HPAC,* 1660 *Boone Ave., New York* 60. "Styropol" designed for use in insulation field, particularly for pipe wrapping made from polystyrene foam, manufacturer says.

STRIP CHART RECORDER for automatic plotting of continuous curve showing relationship of one measured variable to another — *Bristol Co., Dept. HPAC, Waterbury* 20, *Conn.* Records on 12 in. chart. Available in pen speeds to 0.4 sec.

WHITEPRINTING MACHINE for processing ammonia type diazo whiteprints — *Paragon-Revolute Corp., Dept. HPAC,* 77 *South Ave., Rochester* 4. "Revolute Star" offers production speeds to 45 fpm. Front, rear suction tanks provide separation of original and sensitized material, company says.

FILTER, WATER SOFTENER for commercial establishments — *Universal Water Softener Co., Dept. HPAC, Geneva, Ill.* Iron filter in-


In single-phase motors up to 5 hp
In three-phase motors up to 7½ hp

KLIXON MOTOR PROTECTORS

mean maximum safe output, minimum down time

With the new Klixon Inherent Motor Protector for 3-phase motors, you now have available the same full safe capacity from polyphase motors that you have been getting for the past 20 years in single-phase motors.

Motor manufacturers are now able to supply Klixon built-in protection in standard 3-phase motors as well as in single-phase motors.

Motors protected with Klixon Inherent Protectors prevent overheating caused by:

- PROLONGED OVERLOADS
- STALLING
- FAILURE TO START
- LACK OF VENTILATION
- INCREASE IN AMBIENT TEMPERATURES
- PLUGGING OR REVERSING DUTY
- UNBALANCED VOLTAGE

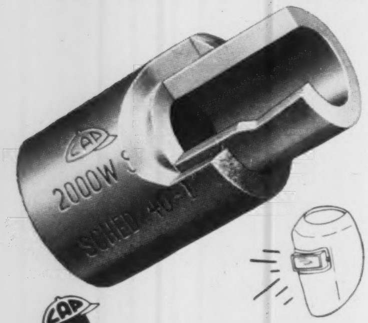
Always specify and use motors — single and polyphase — with built-in Klixon Protectors.

Remember, Klixon automatic and manual reset protectors:

- √ REDUCE PRODUCTION DOWN TIME
- √ MINIMIZE MOTOR REPAIRS AND REPLACEMENTS
- √ ELIMINATE MOTOR BURNOUTS
- √ SIMPLIFY MOTOR CONTROLS
- √ ASSURE MAXIMUM SAFE MOTOR CAPACITY

METALS & CONTROLS CORPORATION
Spencer Thermostat Division 3410 Forest Street, Attleboro, Mass.
KLIXON

Perfect FIT FOR PERFECT *Welds*



Capitol

SOCKET WELD COUPLINGS and CAPS for permanent high-pressure installations

All sizes, 1/8" through 4", Socket Weld Couplings and Caps are available for immediate shipment. Machined from special welding quality steel for better and more permanent installations, these couplings and caps meet the following specifications:

ASTM A-105-46 Grades 1 and 11
ASTM A-106-48T Grades 1 and 11
ASTM A-181-46 Grades 1 and 11

Extra Profit!

Order all of your coupling requirements from

CAPITOL MFG. & SUPPLY CO.
COLUMBUS, OHIO

COUPLINGS — NIPPLES — UNIONS — BUSHINGS — PLUGS — REDUCERS — CAPS—CAPADAPTERS—WELL SUPPLIES

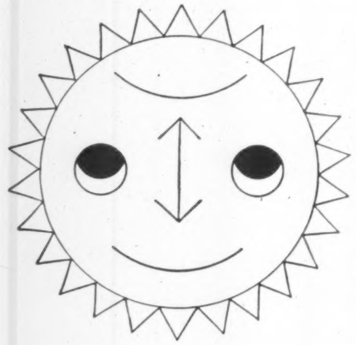
EQUIPMENT DEVELOPMENTS

Continued

corporates air agitation back wash, operates from automatic calendar wheel time clock. Clock can be adjusted to automatically back wash filter weekly or oftener. Water softener has 50,000 grain per each regeneration capacity; will deliver to 350,000 grains weekly or 1,500,000 grains monthly, company says.

AIR CONDITIONING EQUIPMENT added to company's line — *Drayer-Hanson, Div. of National-U.S. Radiator Corp., Dept. HPAC, 3301 Medford St., Los Angeles 63.* "D-H Royal-Aire" available in 3, 5, 7½, 10, 15 hp sizes for stores, commercial, industrial applications. "D-H Dyna-Pac" is packaged air conditioner for small commercial applications in 2, 3, 5 ton sizes, free blow or duct models, option of air cooled or water cooled units. Features cited by company: economy of space, economy in use, decorator styling, sturdy construction. ‡

The tragic fact, our doctors tell us, is that every third cancer death is a needless death... *twice* as many could be saved.

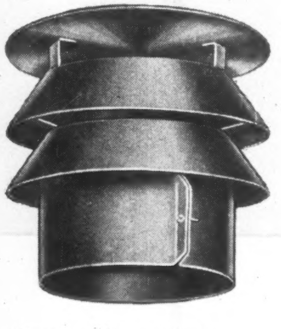


LET'S LOOK AT THE BRIGHTER SIDE

Many thousands of Americans are cured of cancer every year. More and more people are going to their doctors *in time*...To learn how to head off cancer, call the American Cancer Society or write to "Cancer" in care of your local Post Office.

American Cancer Society

Sell Draft King Chimney Caps



You make money . . . Customers save money!

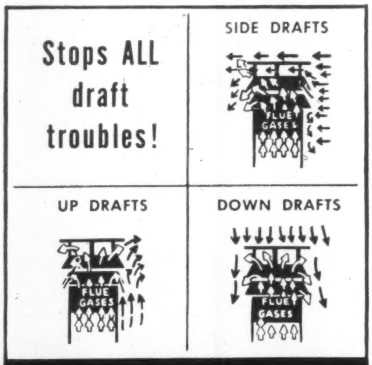
The Perfect Cap for all Chimneys, Flues and Ventilators.

You'll do a volume business with Draft King when customers learn of its money-saving benefits.

Draft King turns flue gases into perfect heating combustion—eliminates chimney clogging soot and costly fuel waste. No moving parts —nothing to wear out. Made of either all-weather galvanized steel or aluminum.

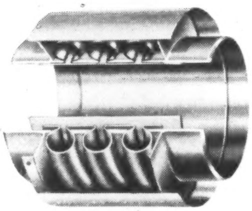
Other DRAFT KING Customer Benefits:

- Wind, rain, snow and ice proof
- Eliminates damaging chimney fires
- Acts as a spark arrester
- Prevents pilot blowouts
- Easy to install
- Improves appearance of chimney
- Priced under competitive makes



Manufactured by
A. R. WOOD MFG. CO.
Luverne, Minnesota

NEW ZALLEA HyPTor* TOROIDAL EXPANSION JOINT



HyPTor corrugations have a circular or toroidal cross section which provides a lower operating stress at any given pressure than any other corrugation shape.

For unequalled endurance at pressure and temperature extremes

This unique toroidal expansion joint with thin-walled bellows is setting new performance and durability records in high pressure, high temperature service. It was developed to meet the severest operating conditions without sacrificing long life.

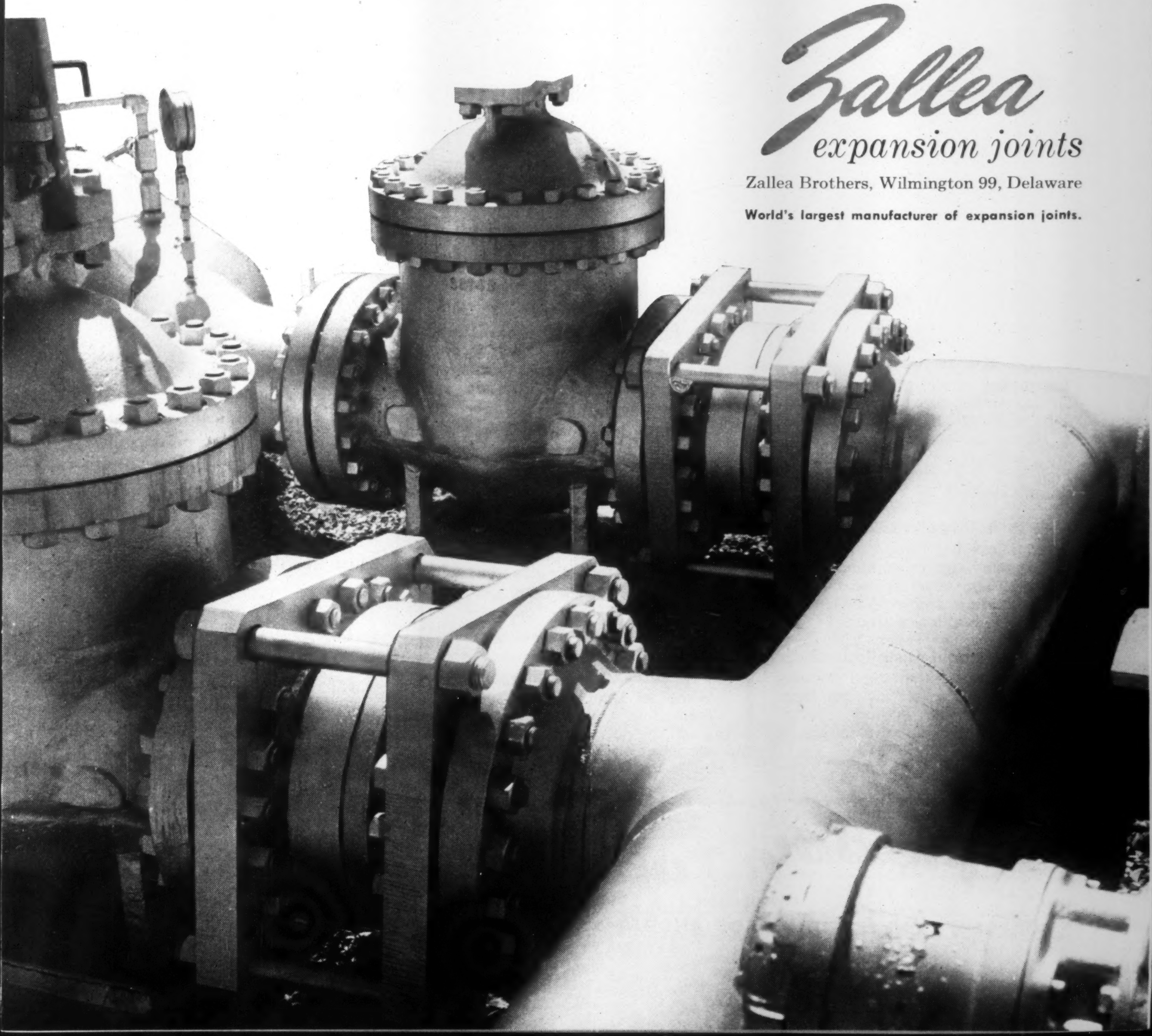
Minimum stress at high pressures is one advantage of the Zallea HyPTor. This is due to the thin-walled bellows and toroidal corrugations. Thin walls develop lowest flexing stress. The toroidal cross section assures lower operating stress at any pressure.

Superior performance at high temperatures. The toroidal corrugation of the HyPTor makes it suitable for use at high temperatures. Also, the HyPTor is hydraulically formed and free from circumferential welds which would act as stress raisers.

Longer life on the job. The ability of the HyPTor to absorb punishment without ill effects has been proved in service. A number of HyPTor Expansion Joints designed for 700 psi working pressure, were installed in liquid oxygen service in 1948. They are still operating . . . at pressures up to 2300 psi.

Get the complete story of the new Zallea HyPTor Expansion Joints. Our new 72-page Expansion Joint Manual gives full details—plus worthwhile information on basic types, design and installation data, expansion joint selection and recommended specifications. Write on your Company letterhead, for your free copy of Catalog 56, Zallea Brothers, 816 Locust Street, Wilmington 99, Delaware.

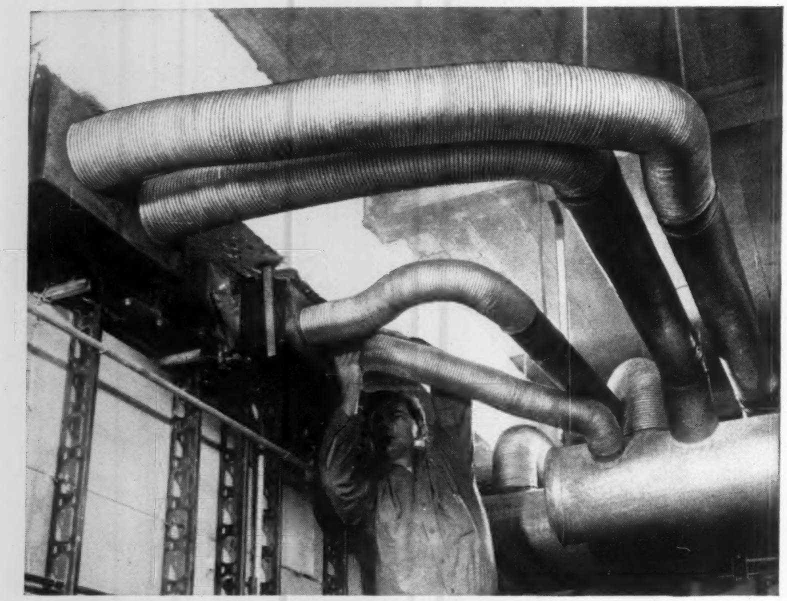
*Patented



Zallea
expansion joints

Zallea Brothers, Wilmington 99, Delaware

World's largest manufacturer of expansion joints.



why you need Thermaflex®

for top performance and time and money savings

What is Thermaflex?
An extremely lightweight, flexible ducting made of a spring steel wire helix covered with a three-ply laminate of woven fiber glass and metallic sheeting.

What are its applications?
Thermaflex is designed to supply air at temperatures ranging from 0°F. to 250°F. It is mainly used as a connector between main lines and diffusers or sound boxes in high and low pressure air-conditioning systems.

Is it flame resistant?
Thermaflex will stand 1200°F.* without any sign of combustion or melting. The covering used in its construction is approved by Underwriters' Laboratories, Inc.

What about installation?
It installs faster than rigid ducting at *savings up to 32%*. One man can do the job without special tools, fittings or elbows in just a few minutes.

What pressures will Thermaflex handle?
25 psi, which is 5 times the minimum standards of the New York Board of Standards and Appeals.

How flexible is Thermaflex?
It takes tight bends with a radius equal to half its own diameter with practically no decrease in cross-sectional area.

How long will it last in service?
Much longer than rigid metal ducting. It is impervious to moisture, rust, rot, fungus and mildew.

How is Thermaflex sold?
In a wide variety of diameters in standard 12-foot lengths that can be easily spliced or cut for long or short runs.

How can I make sure that Thermaflex will solve my problems?
Write to Dept. 70 for more information. Our engineers will be glad to put their experience to work for you.

As approved by the New York Board of Standards and Appeals.

Flexible Tubing
CORPORATION
GUILFORD, CONNECTICUT • LOS ANGELES 64, CALIFORNIA

RECENT TRADE LITERATURE . . .

▶ *ADHESIVES, PLASTIC ALLOYS*—General properties of "Resiweld" adhesives, plastic alloys covered in new 4 page brochure. Chart shows products formulated for bonding similar or unlike surfaces. *H. B. Fuller Co., Dept. HPAC, 255 Eagle St., St. Paul, Minn.*

▶ *AIR CLEANERS*—New 8 page booklet describes "PA, PF Precipitron" air cleaners with "Type CB" collector cells. Among features cited: high velocity operation, high efficiency, 33 percent smaller face area, 50 percent less duct space, automatic moving nozzle washing, "Dustik" cold water wash adhesive. Construction details highlighted. *Sturtevant Div., Westinghouse Electric Corp., Dept. HPAC, 200 Readville St., Hyde Park, Boston 36.*

▶ *AIR CONDITIONING SYSTEMS*—Nine models, 32 arrangements of "Flexazone" central plant air conditioning systems are subject of new 8 page brochure CG-5715. Features cited: horizontal units with horizontal discharge; vertical units with angular discharge; heavy duty structural steel angle iron frame construction; electric welding for rigidity. *Drayer-Hanson, Div. of National-U.S. Radiator Corp., Dept. HPAC, 3301 Medford St., Los Angeles 63.*

▶ *AIR COOLED CONDENSERS*—New bulletin AC-101 describes air cooled condensers for remote installations. Several methods of operating air cooled condensers at low winter temperatures shown with description of "Limitrol" system using modulating valve to automatically maintain balance between condenser, compressor under all weather conditions. Engineering data included. *Halstead & Mitchell, Dept. HPAC, Bessemer Bldg., Pittsburgh 22.*

Are we ready to... *air condition* our school rooms?

which way comfort?

Nesbitt

...comfort all ways

Syncretizer Unit Ventilator

Series *Wind-o-line* System

Mainline System

Year'round Air Conditioners:
  Syncretizer and *Mainliner* for classrooms
  Roommate for offices
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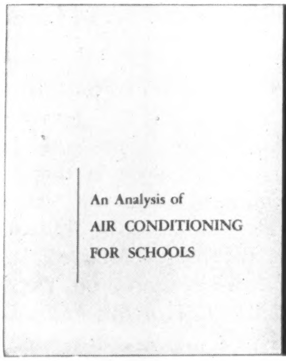
Are school boards ready? While many schools have not yet installed an adequate system of heating and cooling by controlled ventilation, many others find such protection indispensable—and even think of adding mechanical refrigeration for cooling at certain times of year. Needs vary in different parts of the country; but wherever school buildings are to be used all year round—and in areas where outside temperatures are often above 60° during the normal school term—a complete system of heating, ventilating, natural cooling, and air conditioning is the only assurance of a comfortable learning environment at all times. Therefore many school executives and board members are giving serious thought to air conditioning in tomorrow's schools.

Are taxpayers and bondholders ready? The people who supply the money for public education will have many questions about the cost of installing and operating year-round air conditioning, but the facts will be weighed against the benefits to students and community.

Are architects and engineers ready? Is contemporary school building design well suited to the employment of summer air conditioning? What effect upon design will the growing desire for year-round comfort protection have? How best design the system—for installation all at once or in successive stages?

IS NESBITT READY? With more than a quarter-century of experience in the manufacture of air conditioning components, Nesbitt is prepared to offer its Year'round Air Conditioners (*Syncretizer* and *Mainliner* for classrooms; *Roommate* for offices; and *AudiCon* for auditoriums). All Nesbitt Year'round units may be installed initially for heating and cooling by controlled ventilation, and the summer cooling components may be added later.

Are you ready? Whatever your relation to the school field, you probably have questions: What is involved in air conditioning a school? What are the initial and the operating costs? What must be considered before deciding to install controlled ventilation now and mechanical refrigeration later? These and many other questions are answered in the treatise by Nesbitt engineers, "An Analysis of Air Conditioning for Schools." Mail this coupon for your free copy.



An Analysis of
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FOR SCHOOLS

this free publication will answer many of your questions

JOHN J. NESBITT, INC., DEPT. K
PHILADELPHIA 36, PA.

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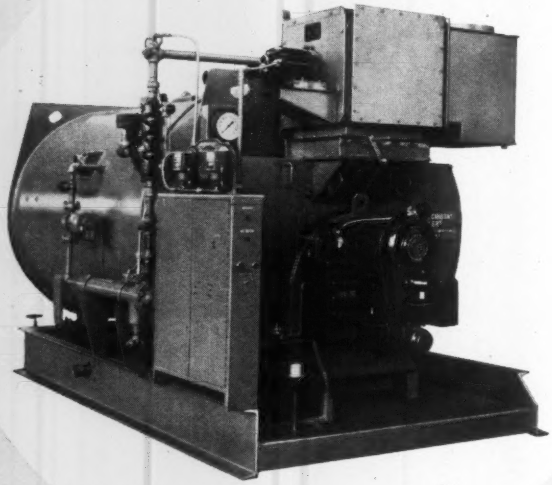

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PACKAGED
BOILER UNIT

For detailed information about this boiler — catalog sheets, brochures, and specifications — write today to the Fitzgibbons Boiler Company, address below.

Full wet back construction provides complete water jacketing of the entire rear combustion chamber. There are *no* refractory arches or walls to deteriorate and replace. Fitzgibbons has always pioneered this design.

Sizes up to 464 horsepower for oil or gas firing are available. *All* units are *factory tested* before shipment.

This is a complete unit — a "Scotch" type steel boiler with burner, fully automatic controls and safety devices, and the induced draft fan for cleaner, quieter operation at high efficiency without a stack.

Domestic hot water supply for any purpose is constantly and effectively furnished through the famous Fitzgibbons "Tanksaver"® — a finned, copper coil submerged in the boiler where the water is the hottest.

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RECENT TRADE LITERATURE

Continued

▶ *AIR HANDLING EQUIPMENT*—New 4 page brochure discusses "Thermotank" systems for air conditioning; "Agitair" square, rectangular, continuous air diffusers. Illustration of equipment included. *Air Devices Inc., Dept. HPAC,* 185 *Madison Ave., New York* 16.

▶ *AUTOMATIC BOILERS*—New 4 page bulletin No. 1243 highlights "Power Pak" automatic boilers for steam or hot water heating, hot water service. Units available in 15 hp range for pressures to 15 psi, equipped with either oil or gas firing burners. Recommended by company for heating and low pressure process applications. *Orr & Sembower, Inc., Dept. HPAC, Morgantown Rd., Reading, Pa.*

▶ *AUTOMATIC BOILERS*—Packaged automatic boilers described in 24 page bulletin No. 12451. Units equipped to operate on oil, gas or both; available in sizes ranging from 40 to 500 hp. Dimensions, weights, ratings given. *Orr and Sembower, Inc., Dept. HPAC, Morgantown Rd., Reading, Pa.*

▶ *BIN DISCHARGE UNIT*—Brochure 500-830 describes new bulk storage bin discharge device that unloads coal without arching, ratholing or funneling. "Easy Flo" unit can also be used for other bulk solids in dry, semi-dry or moist condition, says company. *Bituminous Coal Research, Inc., Dept. HPAC,* 121 *Meyran Ave., Pittsburgh* 13.

▶ *BRASS HOSE FITTINGS*—New 8 page bulletin No. 140 describes "Le-Hi" brass hose fittings for low, medium pressure service in conveying air, spray, steam, suction, water, welding, etc. Technical data listed in 21 charts. Illustrations included. *Le-Hi Div., Hose Accessories Co., Dept. HPAC,* 2704 *N.* 17*th St., Philadelphia* 32.

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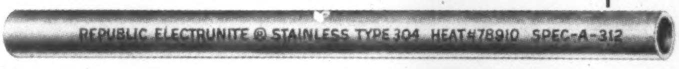
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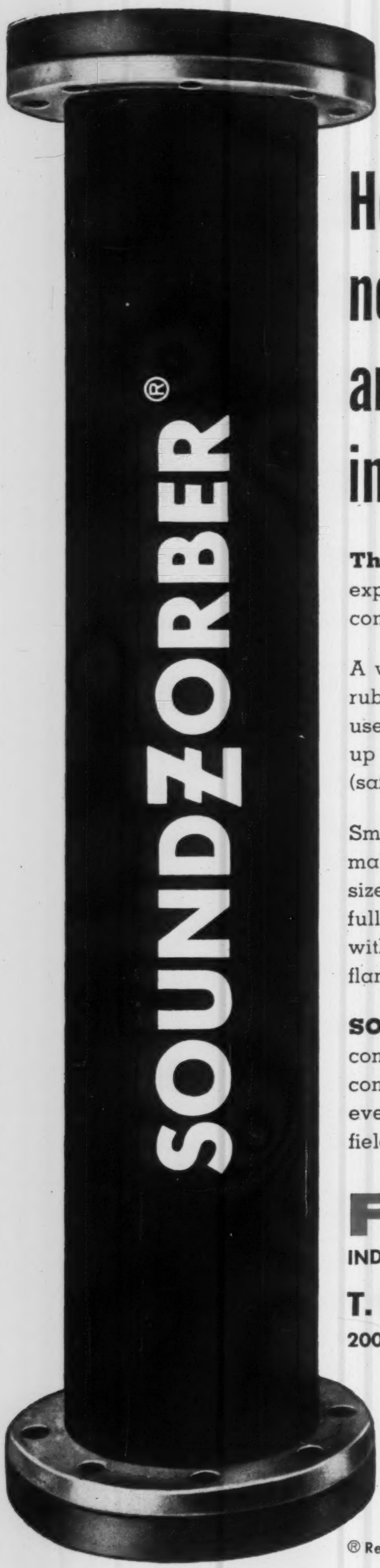

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The original SoundZorber expressly designed for use in air conditioning water lines . . .

A wire-reinforced wrapped fabric rubber pipe, SOUNDZORBER can be used continuously in water lines at up to 250 psi working pressure (safety factor: 5 to 1).

Smaller sizes ½" to 3" available with male I.P.T. bronze fittings. Larger sizes available with integral full-faced rubber flanges backed up with Series 15 or Series 30 steel flanges. No metal-to-metal contact.

SOUNDZORBER is but one of a complete line of Finn vibration controls. Finn has control devices for every vibration problem in your field. Write for complete information.

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RECENT TRADE LITERATURE

Continued

▶ *BTU METER*—New bulletin No. 1000 describes mechanical "Pollux" Btu integrating meter. Unit measures heat in thermal units and liquid flow in gallons. Literature contains construction, operation features; data on size, pressure, temperature ranges. *Air Conditioning Equipment Corp., Dept. HPAC, 219 E. 44th St., New York* 17.

▶ *BULK GASES*—Bulk delivery method of handling industrial gases in large quantities explained in 16 page catalog No. 450. Pictured are group of installations. *Air Reduction Sales Co., Div. of Air Reduction Co., Inc., Dept. HPAC, 150 E. 42nd St., New York* 17.

▶ *CHILLED, HOT WATER SYSTEMS*—New 8 page catalog describes "hydromation" systems for chilled, hot water systems. Among features cited: compactness, unit construction, automatic central system functioning year 'round. *Admiral Engineering Co., Inc., Dept. HPAC, 900 W. Erie St., Chicago* 22.

▶ *CIRCULATING PUMPS*—New line of vertical (immersion type) circulating pumps designed for circulating systems of process equipment described in bulletin No. 4310. Recommended applications, capacity, head performance table, construction features, dimensional drawings included. *Deming Co., Dept. HPAC, Salem, Ohio.*

▶ *COMBUSTION CONTROL*—First of ten booklets on *Systems Engineering Applied to Combustion Control* explains how "systems concept" produces automation in combustion. Fundamentals, requirements, mechanics of draft control highlighted. Illustrated with diagrams, photographs. *Cleveland Fuel Equipment Co., Dept. HPAC,* 1111 *Brookpark Rd., Cleveland* 9.

"Sure I save money and get a better job with 'SCOTCHRAP.'* The big plus is convenience. You can coat ten feet or a thousand without getting a lot of equipment set up. That way you coat when it's convenient and never delay other parts of the construction job."

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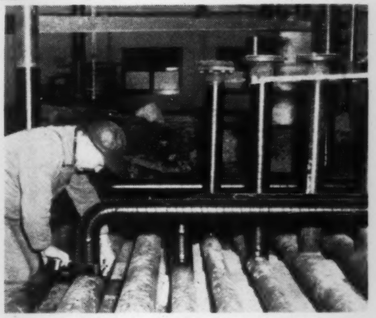
Portland, Oregon

* "SCOTCHRAP" is tough polyvinyl chloride plastic in pressure-sensitive tape form. Strong; conformable; sticks at a touch.

FINISHING off risers for truck transport loading dock with "Scotchrap" Brand Pipe Insulation. P. S. Lord Co. wrapped total of 1,250 feet of 6-inch pipe and 950 feet of 4-inch pipe on this job . . . all with "Scotchrap."

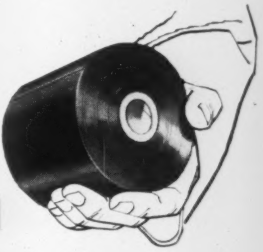
USE of Betzel Tapester speeded application to long lengths of pipe. Joints and fittings were hand wrapped.



JOINTS, elbows, tees, etc. are quickly wrapped by hand for perfect protection. Polyvinyl chloride "SCOTCHRAP" is tough, stretchy, conformable . . . positively seals out moisture and corrosion for permanent pipe protection.

GET THE COMPLETE STORY: Send for free booklets describing protective qualities and easy application of "SCOTCHRAP." Just write on your letterhead to 3M Co., St. Paul 6, Minn., Dept. PD-107.

The modern pipe protection that comes in rolls.



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This is the pump that cuts installation and maintenance costs to the minimum!

Permits well location anywhere a well can be drilled. No costly pump houses, no unsightly installations, no line shafts, no packing boxes or lubrication devices. Installation is fast and economical. Fairbanks-Morse motor has lifetime Copperspun rotor cooled and lubricated by water; gives full motor output. Practically soundless.

Fairbanks-Morse water-lubricated submersible pumps cover a wide range of volume, pressure, and setting depth requirements. Ask your F-M Sales Engineer for Bulletin 6910, or write Fairbanks, Morse & Co., Dept. HPA-10, 600 So. Michigan Ave., Chicago 5, Ill.

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RAIL CARS • HOME WATER SERVICE EQUIPMENT • MAGNETOS

RECENT TRADE LITERATURE

Continued

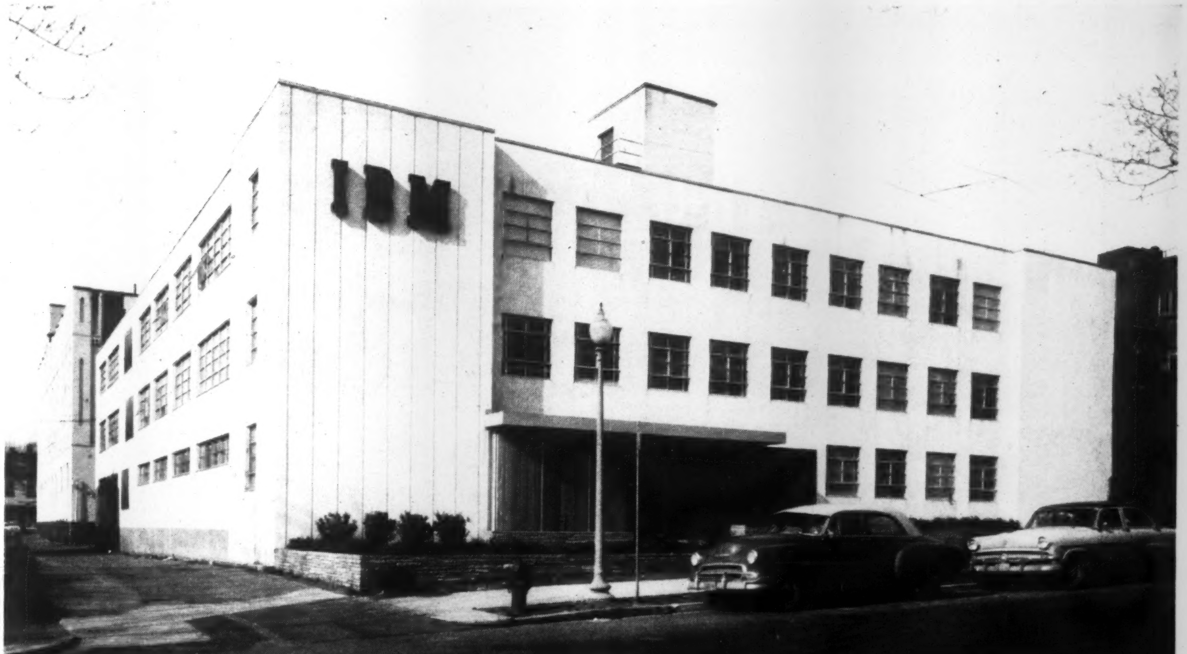
▶ *COMBUSTION EFFICIENCY*—Combustion efficiency chart designed to give overall efficiency of furnace, boiler. Chart made of durable plastic, requires no independent calculations, may be used with high degree of accuracy by almost anyone, company says. *F. W. Dwyer Mfg. Co., Dept. HPAC, Box 373, Michigan City, Ind.*

▶ *COOLING SYSTEMS*—Single stage "Freon-11" turbo water cooling systems in capacities of 115 to 350 tons covered in 32 page brochure. Diagrams of system components; weight, dimension charts; engineering specifications highlighted. *Industrial Div., York Corp., Dept. HPAC, York, Pa.*

▶ *COOLING TOWERS*—New 4 page booklet D-57-1 describes methods of combating corrosion and delignification in cooling towers with use of controlled volume pumps that meter precise quantities of chemicals to cooling water. Details, drawings explain continuous pH control using "Mersemetric" pumps, acid metered in proportion to flow rate, chemical feed with automatic level control. *Milton Roy Co., Dept. HPAC, 1300 E. Mermaid Ln., Philadelphia 18.*

▶ *COOLING WATER SYSTEM*—Technical paper No. 137, *A Case History in Cooling Water Treatment*, discusses problems of corrosion, tower wood deterioration. Case history is cited showing how program of treating cooling water was undertaken both to minimize attack on wood, prevent corrosion. *Betz Laboratories, Inc., Dept. HPAC, Gillingham & Worth Sts., Philadelphia 24.*

▶ *DRUM BOILERS*—Twelve page catalog SB-58 contains design, construction, application information about "VC" two-drum boilers. Units said to provide high capacity in compact design that saves space and lowers installation and maintenance costs. *Erie City Iron Works, Dept. HPAC, Erie, Pa.*



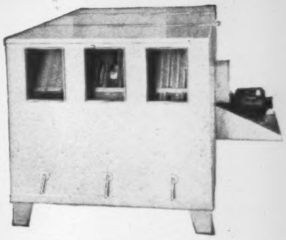
IBM's Handsome Washington Offices Comfort Conditioned By Marlo

At IBM's handsome offices in Washington, D. C., comfort never takes a holiday, with Marlo equipment on duty around the calendar.

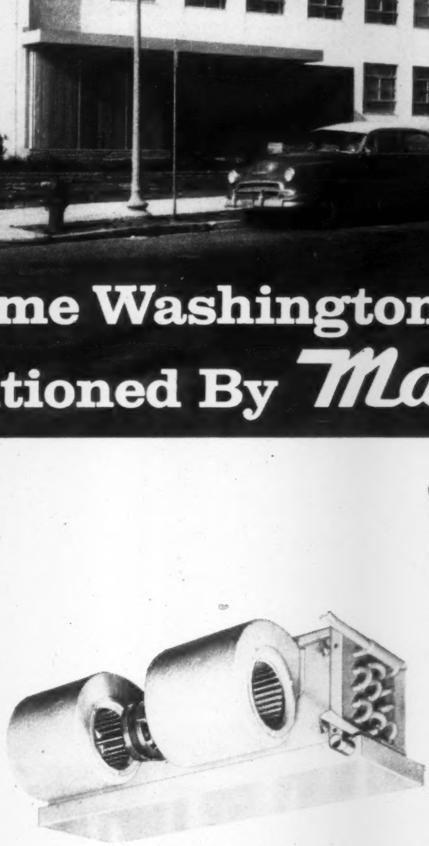
Summer cooling and winter heating in this modern structure are provided by three types of Marlo equipment: three multi-zone air conditioners, the versatile units that can perform several different conditioning functions simultaneously; a remote room unit, horizontal recessed style; and an evaporative condenser.

Mechanical contractor on the project was John C. Grimberg Company. Architect was John Hans Graham & Associates, general contractor was Blake Construction Company, and mechanical engineer was Shefferman & Luchenburg.

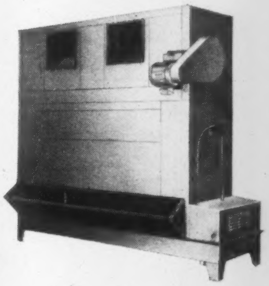
Write today for complete information on the Marlo quality line of air conditioning and heat transfer equipment.



MULTI-ZONE UNIT



REMOTE ROOM UNIT



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MARLO coil co.

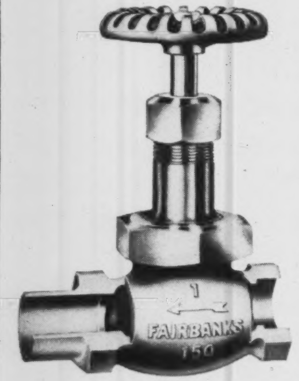
SAINT LOUIS 10, MISSOURI

Quality Air Conditioning and Heat Transfer Equipment Since 1925

insure permanent leakproof joints

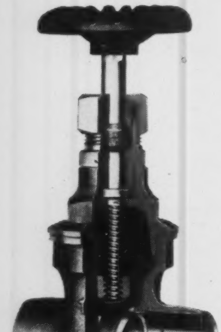
in copper or brass piping

Fairbanks THREADLESS Valves



"Fairco-Braze" Threadless Valves for silver brazed joints. Cut costs, speed installation of piping systems handling steam, hot or cold water, oil, compressed air, carbon dioxide, Freon and many other liquids and gases with Fairbanks "Fairco-Braze" Threadless Bronze Valves. Silver brazed joints permit the widest selection of materials as "Fairco-Braze" Valves in any type, through pressure ratings of 300 pounds steam working pressure, give permanent leakproof joints with copper, yellow brass, red brass, copper nickel, monel or steel pipe and type "B" copper tubing.

The silver brazed connection withstands tension, compression, torsion and vibration to a far greater degree than any other type joint and at the same time provides greater corrosion resistance.



Solder End Threadless Valves for soldered joints. Get perfect seal of valves for type "K", "L" and "M" copper tubing with Fairbanks Solder End Threadless Valves. Close fit of tubing and valve socket produces a capillary action that draws the molten solder in for the entire length and completely around the circumference of the connection. Simple, quick installation provides a smooth, compact, full flow assembly that has high resistance to corrosion.

Full line of Fairbanks Solder End Threadless Valves — Globes, Gates and Checks — have an unusually wide application range: ideal for hot and cold water lines, for low pressure steam lines, and underground water lines; in plumbing, heating, and air conditioning systems. Industrial uses include water, oil, air and vacuum lines, low pressure steam lines, pressure lubrication systems, dye lines in textile mills, liquor lines in breweries and distilleries.

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CATALOG 51
THE FAIRBANKS COMPANY

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Fairbanks Valves Catalog, complete with cutaways, details, and specifications describing these Fairbanks Threadless Valves.

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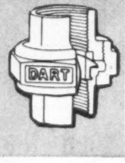


RECENT TRADE LITERATURE

Continued

▶ *DUST COLLECTOR*—New 16 page bulletin No. 274B discusses operation of "Type W Roto-Clone" dust collector. Company says water spray maintains flowing film of water on collecting surfaces which lowers water requirements to a minimum; traps lightest, finest dust particles; delivers collected dust in slurry form for easy disposal. Engineering data included. *American Air Filter Co., Inc., Dept. HPAC,* 215 *Central Ave., Louisville* 8.

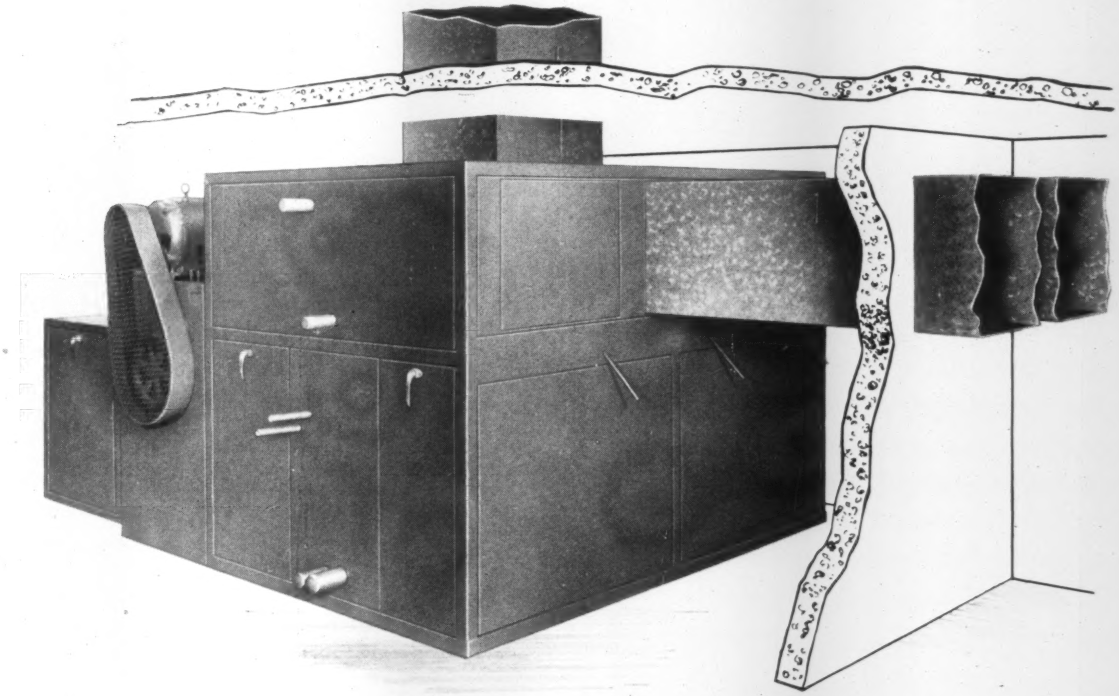
▶ *FANS*—New 24 page bulletin MD-102 explains construction, operations, specifications of aerodynamically designed packaged direct drive, v-belt fans designed for industrial and commercial installations, public buildings. Performance data, dimensions, drawings, practical applications included. *Chicago Blower Corp., Dept. HPAC,* 9863 *Pacific Ave., Franklin Park, Ill.*

▶ *FILTERS*—New 8 page booklet describes "Airpure" filters. Units recommended by company for screening out particles 0.1 micron in size, withstanding temperatures to 2300 F. Illustrations, selection charts, sizes, rated flows included. *Flanders Filters, Inc., Dept. HPAC, Box* 718, *Riverhead, N. Y.*

▶ *GAS HEATERS*—"Panelbloc" overhead gas-fired heaters illustrated, described in 16 page bulletin PL-57. Uses of units pictured in variety of commercial, industrial plants. *Thermobloc Div., Prat-Daniel Corp., Dept. HPAC, South Norwalk, Conn.*

▶ *GAS THERMOSTAT*—Heavy duty, high capacity gas thermostat for use in commercial, industrial equipment described in bulletin RT-815. Unit is snap acting, available in temperature ranges to 550 F, designed for use where quick response to temperature changes is required. *Robertshaw-Fulton Controls Co., Dept. HPAC,* 110 *E. Otterman St., Greensburg, Pa.*

KENNARD *Engineered* MULTI-ZONE AIR CONDITIONING UNITS



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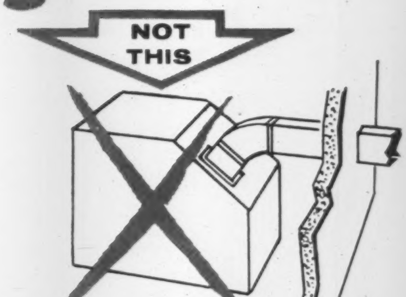
Save 45° Turns



Duct openings available horizontal or vertical in any combination . . . run risers or laterals straight from unit without transitions.

Lowers sheet metal costs.

Reduces duct static resistance.

Saves space.

Write for name of nearest representative and copy of Catalog No. MZ-2.

KENNARD CORPORATION
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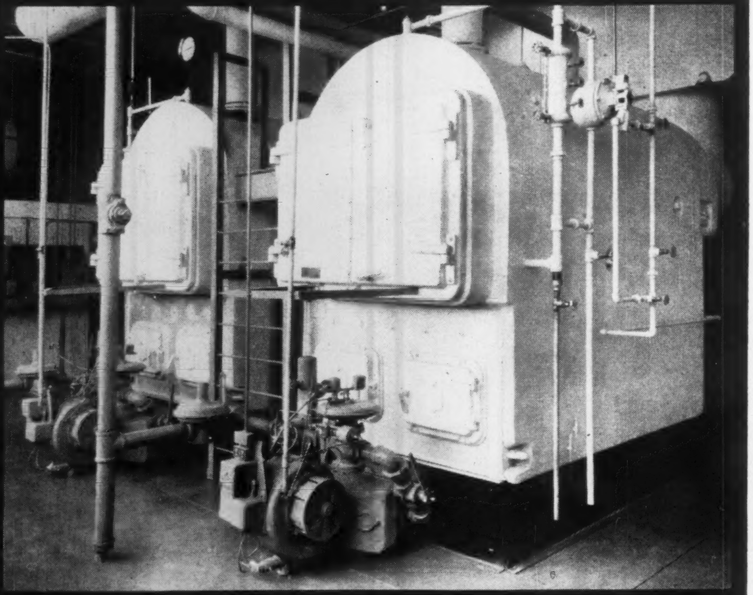
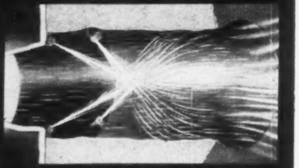
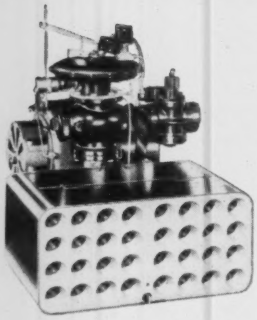
Mettler "FAN-AIR" Gas Burners
chosen for unusual boiler installation



Here's the difference . . .

Unique Mettler "ENTRAINED COMBUSTION" design. Wide "turn down range" without backfiring. Four orifices per port (instead of the usual one), means *top* efficiency. Orifices are *replaceable*, too.





Functional use of color improves working conditions and actually makes this boiler room an attractive "show place." Choice of "FAN-AIR" Gas Burners for the boilers upgrades working conditions, too, because they're quiet . . . clean firing . . and safe! Safety is a standout feature of Mettler Burners. Their exclusive pilot rectification control system is a newer, more advanced method of safeguarding burners. Another "FAN-AIR" *first* is replaceable gas orifices . . . a feature that permits engineering the size of the orifice to each job, matching available gas pressure to desired input for ultimate in air-gas mixing. This gives you completely flexible application (with mechanical or natural draft) and maximum *efficiency* . . . at real money saving low cost.
Write for literature and specifications, today.

METTLER

Eclipse

THE METTLER CO., INC.
Division of ECLIPSE FUEL ENGINEERING CO.
4366 Worth Street, Los Angeles 63, California

RECENT TRADE LITERATURE

Continued

▶ *HEAT EXCHANGERS*—"Trufin Type S/T" shell and tube heat exchangers discussed in new 20 page booklet. Features of plain tube and "Trufin" listed with charts, tables. *Wolverine Tube, Div. of Calumet & Hecla, Inc., Dept. HPAC, 1461 Central Ave., Detroit.*

▶ *HEATING, AIR CONDITIONING EQUIPMENT*—New 32 page catalog lists data on water chillers, air conditioners, air handling units, heating units, ventilating units. Performance information, product capacities, styles included. *Trane Co., Dept. HPAC, LaCrosse, Wis.*

▶ *HEATING, AIR CONDITIONING TOOLS*—New 8 page catalog PC-601 describes tools utilized in heating, air conditioning trade. "Grips Rite" angle head; "Handy Angle" saw, attachments; pipe fitters' boring sets; "Magic Feed" portable bits are among tools illustrated. *Price & Rutzebeck, Dept. HPAC, Box 30, Hayward, Calif.*

▶ *HEATING VALVES*—Catalog PH 58 explains valve requirements of heating systems. Described are air, vacuum radiator venting valves for steam and hot water systems; water mixers; relief valves; flow control valves; solenoid valves. *Dole Valve Co., Dept. HPAC, Morton Grove, Ill.*

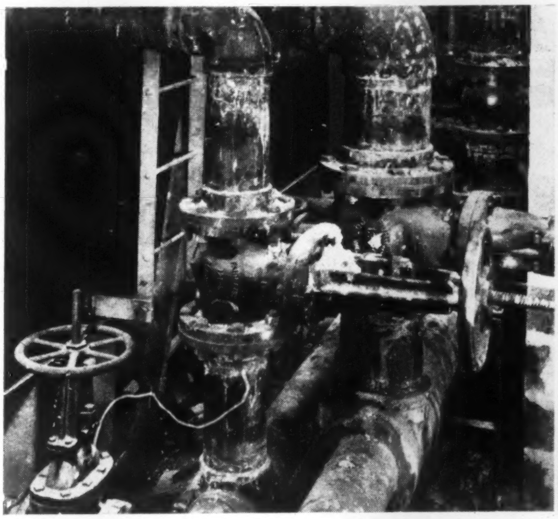
▶ *LUBRICATED PLUG VALVES*—New 12 page manual on lubricated plug valves describes function of lubricants in plug valves, essential properties of effective lubricants. Chart lists 560 flow materials which lubricated plug valves service together with recommended lubricant numbers. *Walworth Co., Dept. HPAC, 60 E. 42nd St., New York 17.*

▶ *MECHANICAL TUBING*—Eight page bulletin TB-340-A describes how seamless tubing is manufactured, finished; differences in dimensional tolerances; costs; machin-

Three men in agreement:

Tube joints brazed with SIL-FOS and EASY-FLO are best…

FOR WATER SYSTEMS, FOR AIR-CONDITIONING SYSTEMS, FOR HEATING SYSTEMS



Architects, Engineers and Plumbing Contractors all find that silver brazing nonferrous pipe and tubing systems with Handy & Harman Sil-Fos or Easy-Flo is the simplest, surest, most economical way to permanently bond all joints. Here's why:

1. ***Simplest because*** silver brazing eliminates all threading, cuts way down on handling and assembly time.
2. ***Surest because*** Sil-Fos and Easy-Flo joints are stronger than the parent metal itself. Creep, vibration, turbulence are minimized…joints are positive, leak-tight, maintenance-free.
3. ***Most economical because*** silver brazing permits use of lightweight tubing—saves tons in weight and in material, installation and handling costs.

New structures of every description are getting the "brazed joint treatment" in their water, air-conditioning and heating systems…let us show you how Handy & Harman silver alloy brazing can make the next job you do easier and more profitable.

YOU'LL BE OFF TO A GOOD START WITH THESE:

Bulletin 17—How to Braze Pipe and Tubing

Bulletin 20—Tells and shows you why and how Sil-Fos and Easy-Flo make leak-tight and maintenance-free joints a permanent certainty

Brazing News #71—Tells why plumbing contractors for office buildings, institutions, apartments are "brazing in" with Sil-Fos and Easy-Flo

DISTRIBUTOR LIST

There's an authorized Sil-Fos and Easy-Flo distributor near you. If you don't know his name, our Distributor List will tell you who and where he is; send for it.

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FLOW
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DURABLA REDUCING COUPLINGS NOW AVAILABLE FOR USE WITH BASIC CHECK UNITS

this combination is all you need to form a low cost, all stainless-steel check valve

Now, you can get DURABLA Reducing Couplings to match DURABLA Basic Check Units. Supplied in line sizes from ⅜" to 2", they are recommended wherever a complete stainless steel (18-8) line check valve is required.

There has been no change in the Basic Check Unit. It can still be used with *any standard pipe fitting* or, now, with a DURABLA Reducing Coupling. In either case, you have a complete check valve that will operate in any position—horizontally, vertically (with the inlet either up or down), and at any angle between. Suitable for almost any service—over a wide range of pressure-temperature ratings.

With a few of these units in stock you can meet practically any check valve emergency. For the full story, send for a copy of *new* 8-page bulletin HPA107.

DURABLA MANUFACTURING COMPANY
114 Liberty Street, New York 6, N. Y.

Basic Check Unit
(Pat. No. 2,649,277)

Reducing Coupling

Complete Check Valve

DURABLA

DM-31

RECENT TRADE LITERATURE

Continued

ability; surface finishes of various types of seamless mechanical tubing. Engineering data, charts, pictures included. *Babcock & Wilcox Co., Tubular Products Div., Dept. HPAC, Beaver Falls, Pa.*

▶ *METERS*—Bulletin No. 195 describes new line operated pH meter "Model 85." Unit, suited for pH tests and titrations, has 3 in. long scale, covers complete pH range zero to 14, can be read to accuracy of 0.1 pH unit, company says. *Photovolt Corp., Dept. HPAC, 95 Madison Ave., New York 16.*

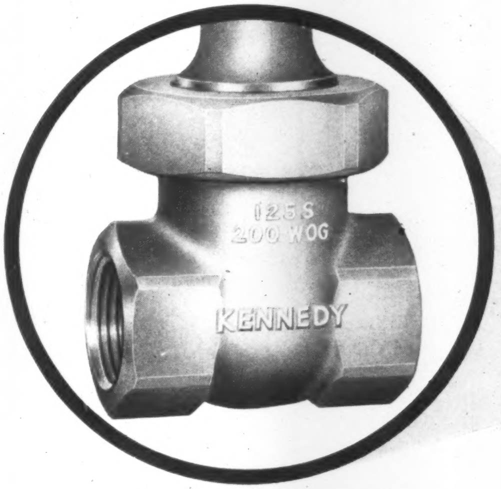
▶ *MOUNTED BEARINGS*—New 8 page bulletin A-668 describes "Spher-Align Pillow Block" mounted bearings. Features cited: "Micro-Mount" providing for fast, accurate seating of bearings on shafts; spherical roller bearings design; thorough lubrication system; triple labyrinth seals; rugged housings of close grained semi-steel. *Dodge Mfg. Corp., Dept. HPAC, Mishawaka, Ind.*

▶ *OIL BURNING EQUIPMENT*—Four page manual gives data, formulas, general information concerning performance, efficiency of oil burning equipment. Potential deficiencies; their significance, remedy included. *Cleveland Fuel Equipment Co., Dept. HPAC, 1111 Brookpark Rd., Cleveland 9.*

▶ *PIPE, FITTINGS*—"Luzerne" polyvinyl chloride pipe, fittings described in new 8 page bulletin PF 1200. Features cited: lightness in weight, ease of installation, ruggedness. *Luzerne Rubber Co., Dept. HPAC, Trenton, N. J.*

▶ *PIPE, FITTINGS; VALVES*—New 12 page catalog describes regular and high impact corrosion resistant rigid polyvinyl chloride pipe. Tables show pipe sizes, chemical ap-

Here's How KENNEDY'S Union Bonnet and Cylindrical Body Simplify Installation and Increase Valve Life...



125-Pound SWP Bronze Gate Valve
Union Bonnet Rising Stem
Inside Screw Wedge Disc

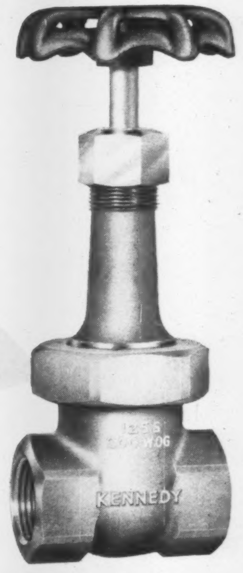
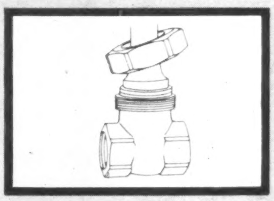
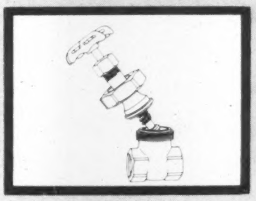


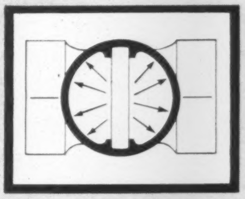
Fig. 525



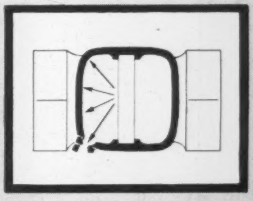
Kennedy's Union Bonnet permits repeated dismantling for cleaning or inspection and reassembly without danger of distortion of the valve. The bronze-to-bronze construction makes a tight union for tight, leakproof operation.



Kennedy's Fig. 525 can be easily disassembled into component parts for installation in otherwise inaccessable places in existing lines or for new installations.



Kennedy's cylindrical body construction when under severe pressure resists rupture and minimizes deflection thus preventing leakage at the seat.



Pressure in ordinary non-cylindrical valve bodies tries to push the body wall out to form a circle or cylinder. Rupturing stresses concentrate where wall has the shortest radius. Resultant deflection causes leakage over disc and early failure.

These additional advantages make KENNEDY your best valve buy...

Rugged, wider hex ends, blended into body, prevent distortion. On a conventional valve body, hex ends protrude from the body and are connected by thin body wrists. This area under severe wrench pressure, can distort and cause disc seating trouble. Kennedy's wider hex ends are blended into the body making the body and hexes one unit. In this way wrench pressure can be absorbed.

Newest in the valve field . . . best in the valve field . . . Fig. 525 gives greater strength with less bulk and weight than any comparably rated valve.

Kennedy's Fig. 525 can be repacked under pressure, eliminating line shut-downs. You simply open valve fully, remove packing nut and then repack.

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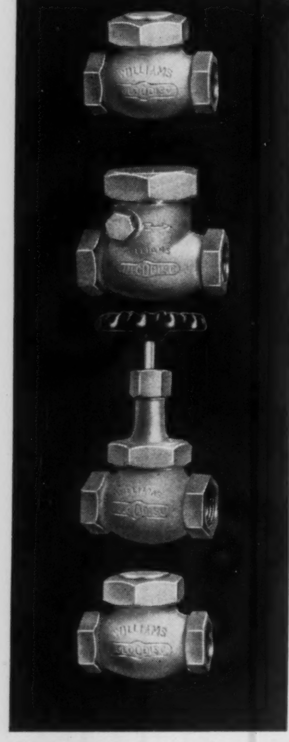

No. 856 "Vulcodisc" Lift Check Valve
Vulcanized asbestos disc. For 200 lbs. working steam pressure at 500° F. or 400 lbs. working non-shock gas and liquid pressure at 150° F. Installed in horizontal position. Screw cap and screw ends.

No. 1086 Swing Check Valve
Vulcanized asbestos disc. For 200 lbs. working steam pressure at 500° F. or 400 lbs. working non-shock gas and liquid pressure at 150° F. Installed in horizontal or vertical position. Screw cap and screw ends.

No. 912 "Vulcodisc" Globe Valve
May be used for steam or hot water with pressures to 200 lbs., temperatures to 500° F.; or water, gas and air to 400 lbs. at 150° F.; for oil to 200 lbs. pressure at 250° F.

No. 833 Horizontal Check Valve
Renewable composition, air disc, integral seat, screw ends, spring loaded disc. 300 lbs. working non-shock gas and liquid pressure at 150° F.

These valves meet all government, marine and industrial specifications.

Quality Protects Your Investment--
American-Standard Quality Is Available At No Extra Cost.

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DETROIT CONTROLS
Division of American-Standard

RECENT TRADE LITERATURE

Continued

plications, physical properties, temperature factors for various working pressures, support spacing, thermal expansion. *Alpha Plastics, Inc., Dept. HPAC, Okner Parkway, Livingston, N. J.*

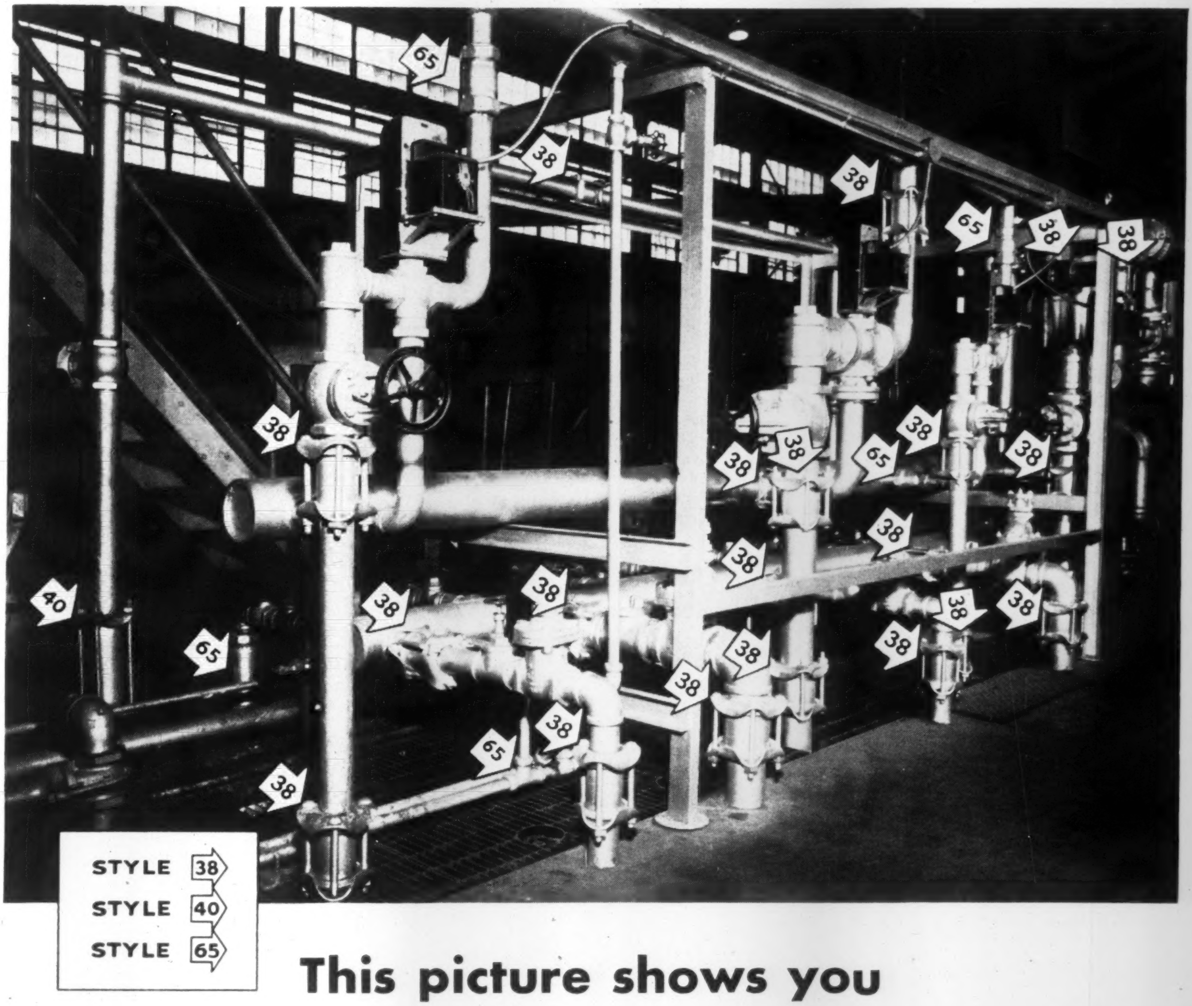
▶ *PIPE HOLE CUTTER*—Literature available on flame cutting machine that cuts circles, ellipses in flat plate and perpendicular or angular holes in pipe or tank shells. Unit said to maintain proper spacing between cutting tip and pipe automatically while cutting. *Steffan Engineering, Dept. HPAC, Salem, Ohio.*

▶ *PIPE, TUBING*—Bulletin TDC-187 describes various methods of bending pipe, tubing. Discussed is press, roll, stationary die, revolving die, wrinkle bending. Drawings included. *Babcock & Wilcox Co., Tubular Products Div., Dept. HPAC, Beaver Falls, Pa.*

▶ *POLYMERS*—New 10 page booklet describes "Kel-F" halofluorocarbon polymers said to be stable and resistant to temperatures, chemically inert and a true thermoplastic. Tables show physical, mechanical, electrical, chemical properties. *Minnesota Mining and Mfg. Co., Dept. HPAC, 900 Bush St., St. Paul* 6.

▶ *PREFABRICATED PIPING*—Tolerances on linear dimensions of prefabricated piping supplied in new 4 page bulletin. Chart shows applications. *Pipe Fabrication Institute, Dept. HPAC, Gateway Center, Pittsburgh* 22.

▶ *PROTECTIVE COATINGS*—Features of halofluorocarbon dispersion coatings for industrial corrosion control, contamination prevention listed in new 4 page booklet. Chemical resistance, thermal stability, toughness, flexibility, abrasion resistance, dielectric strength, anti-sticking surface included in combination of properties offered by "Kel-F" system.



This picture shows you

26 Ways to Save Time, Labor and Money!

Every Dresser Coupling and Compression Fitting is a way to save money — no threading, no exact pipe fitting, no welding, no grooving, no caulking. (And there are 26 of these money savers in this piping setup alone.)

Take those five Style 65 Dresser Compression Fittings, for instance. You simply stab *plain pipe ends* into the fittings and tighten the end nuts. Time: about 30 seconds per joint!

Or take the twenty Style 38 Dresser Couplings (and one Style 40). They're wrench-installed in only two man-minutes per bolt!

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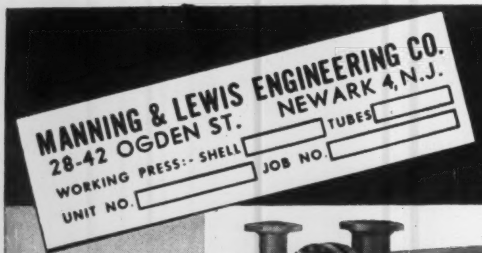
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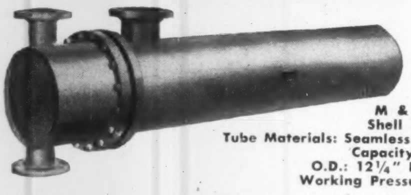

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Shell Material: Steel
Tube Materials: Seamless Drawn Copper
Capacity: 13,200 g.p.h.
O.D.: 12¼" Length: 106½"
Working Pressures: 150 P.S.I.

The above unit is one of several M & L Converters now installed at Idlewild Airport in New York. They were designed and fabricated to furnish the heating system of a hangar with water at 140°F.

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For further details send for your copy of bulletin 780, or we will be happy to send a representative to assist you with any heating or cooling problem.

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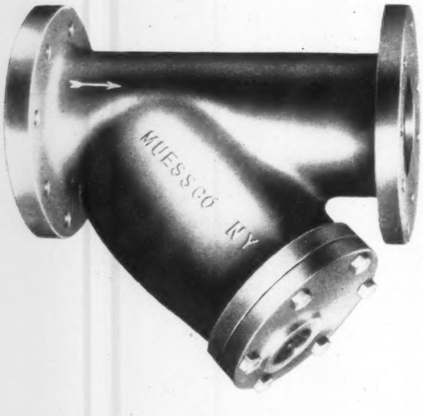

Mueller self-cleaning pipe line strainers are inexpensive protection for valves, meters, pumps, etc. Immediate delivery—all sizes from ¼" through 16" in stock. Use this low cost form of insurance in all your installations.

Write for bulletin AM giving complete data, prices, specifications, etc.

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RECENT TRADE LITERATURE

Continued

Minnesota Mining and Mfg. Co., Dept. HPAC, 900 Bush St., St. Paul 6.

▶ *PUMP CABLE*—Various types of submersible pump cable covered in 4 page brochure. Descriptions given of standard submersible cable, motor lead wire, heavy duty submersible cable, drop cable. Specification charts included. *Essex Wire Corp., Dept. HPAC, 1601 Wall St., Fort Wayne, Ind.*

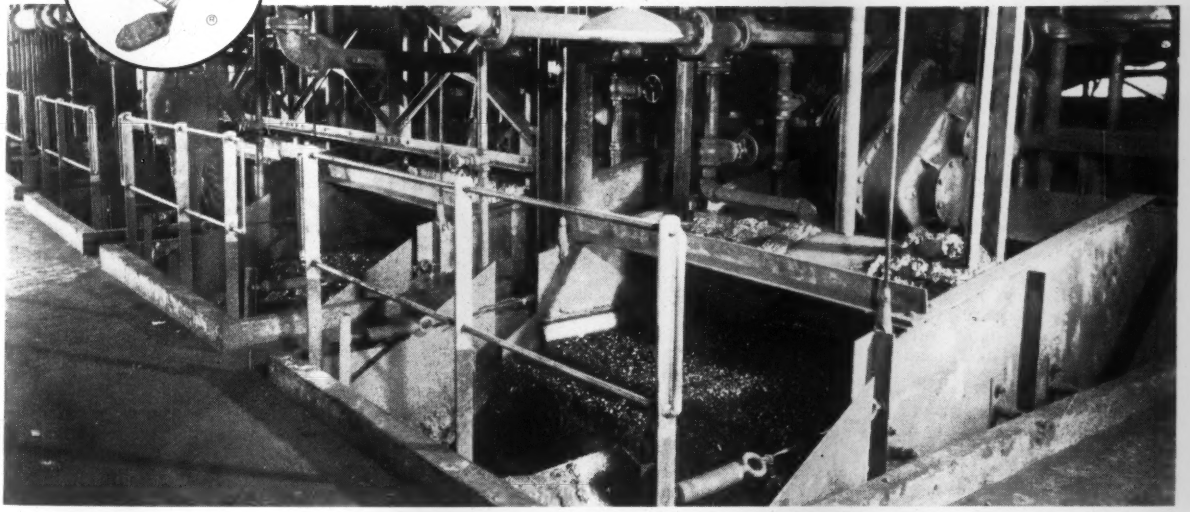
▶ *PUMP CONTROLS*—New 4 page booklet shows how pump controls, water feeders, relief valves are used in high temperature hot water installations. Seven diagrams, six selection tables included. *McDonnell & Miller, Inc., Dept. HPAC, 3500 N. Spaulding Ave., Chicago 18.*

▶ *PUMPS*—New 8 page catalog No. 10.0 describes "Flex-i-liner" sealless plastic, stainless steel pumps; contains technical data, material selection information. Performance data with pump characteristic curves, charts with sizes; capacities; operating pressure ranges shown. *Vanton Pump & Equipment Corp., Dept. HPAC, 201 Sweetland Ave., Hillside, N. J.*

▶ *PUMPS*—Four types of general service pumps listed in 4 page catalog D-100. Units are designed for hot, cold water; brine circulation; air conditioning systems; sprinkler systems; boiler feeding; pressure boosting; washing machinery. *C. H. Wheeler Mfg. Co., Dept. HPAC, 19th & Lehigh Ave., Philadelphia 32.*

▶ *PUMPS, CIRCULATORS*—New data sheet No. 345 gives heads, capacities, information on pumps, circulators used in air conditioning, refrigeration, circulation applications. Units covered are close-coupled, universal drive models designed for efficient pressure boosting, circulation, recirculation of liq-

WHY CHESSIE'S RAILWAY IS FIRST IN COAL



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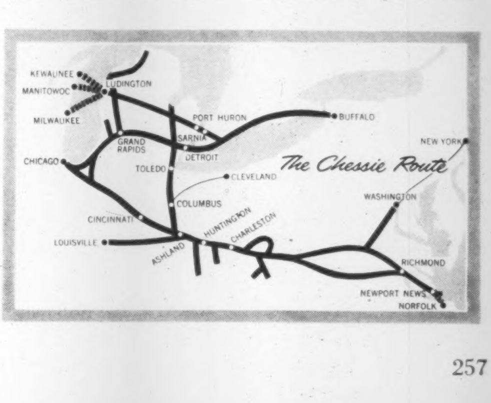
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and sleek, low, roof-hugging silhouette.

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M-Pel-Air wheel is statically *and* dynamically balanced. Rugged, heavy gauge, all aluminum construction and precision assembly withstands constant, most abusive operation.

EASIEST TO INSTALL EASIEST TO SERVICE

Shipped completely assembled, ready to install. Removal of 4 cap nuts provides access to *entire* assembly for wiring and service.

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All M-Pel-Air units are guaranteed to meet or surpass cataloged performance ratings.

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THE NEW LOOK IN POWER EXHAUSTERS

Manufacturers' agents inquiries invited

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McCordsville, Indiana

uids. *Barnes Mfg. Co., Dept. HPAC, Mansfield, Ohio.*

▶ *PURGER*—Automatic, condenser-type purgers, which are electrically and thermostatically controlled, covered in new bulletin. Purge drums—with internal water coil, differential thermostat, solenoid vent valve, metering valve, fittings—in two models for ammonia systems. *J. E. Watkins Co., Dept. HPAC, Maywood, Ill.*

▶ *SELECTOR SWITCHES* — Key and pushbutton selector switches covered in new bulletin No. 24-1. Company says units can check many thermocouples and resistance bulbs by switching them from one instrument to another or switching one instrument to many different measuring points. Various types of two-, three-position switches described. *Thermo Electric Co., Inc., Dept. HPAC, Saddle Brook, N. J.*

▶ *SHADED POLE MOTORS*—New bulletin contains detailed drawings, technical data, information on "402 Long Life" and "401 Standard Life" shaded pole motors. Units designed for small fans, floor heaters, other equipment. *Controls Co. of America, Dept. HPAC, 9555 Soreng Ave., Schiller Park, Ill.*

▶ *SOLENOID VALVES* — New 114 page catalog No. 25 lists information on two-, three-, four-way type solenoid valves; manual reset two-, three-way valves; corrosion resistant valves; special purpose valves; accessories. Construction details, flow diagrams, cross-section views included. *Automatic Switch Co., Dept. HPAC, Florham Park, N. J.*

▶ *STEAM GENERATORS* — New bulletin explains features of "Preferred Unit" steam generators including "Voluvalve" fuel regulator, high speed rotary burner, antistress deck, staggered tubes, etc. Installations at 14 locations described. *Pre-*

ATTENTION WASHINGTON!

D. C. citizen kills Mr. Entropy* — stops steam waste with SELECTOTHERM

Around the nation's capital, Gale Heslop, 1825 Jefferson Pl., N.W., is famed for eliminating steam waste in schools and other buildings where boilers are used for steam heating.

He does it with SELECTOTHERM, the high-vacuum heating system that automatically provides steam at the proper pressure and temperature for perfect comfort. Installation records show that SELECTOTHERM cuts the fuel bill 19% or more—*enough to pay for the system within five years!*

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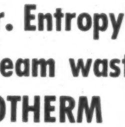
* *Mr. Entropy represents the heat that is produced but unavailable for use.*



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HEATING CONTROL SYSTEM ®

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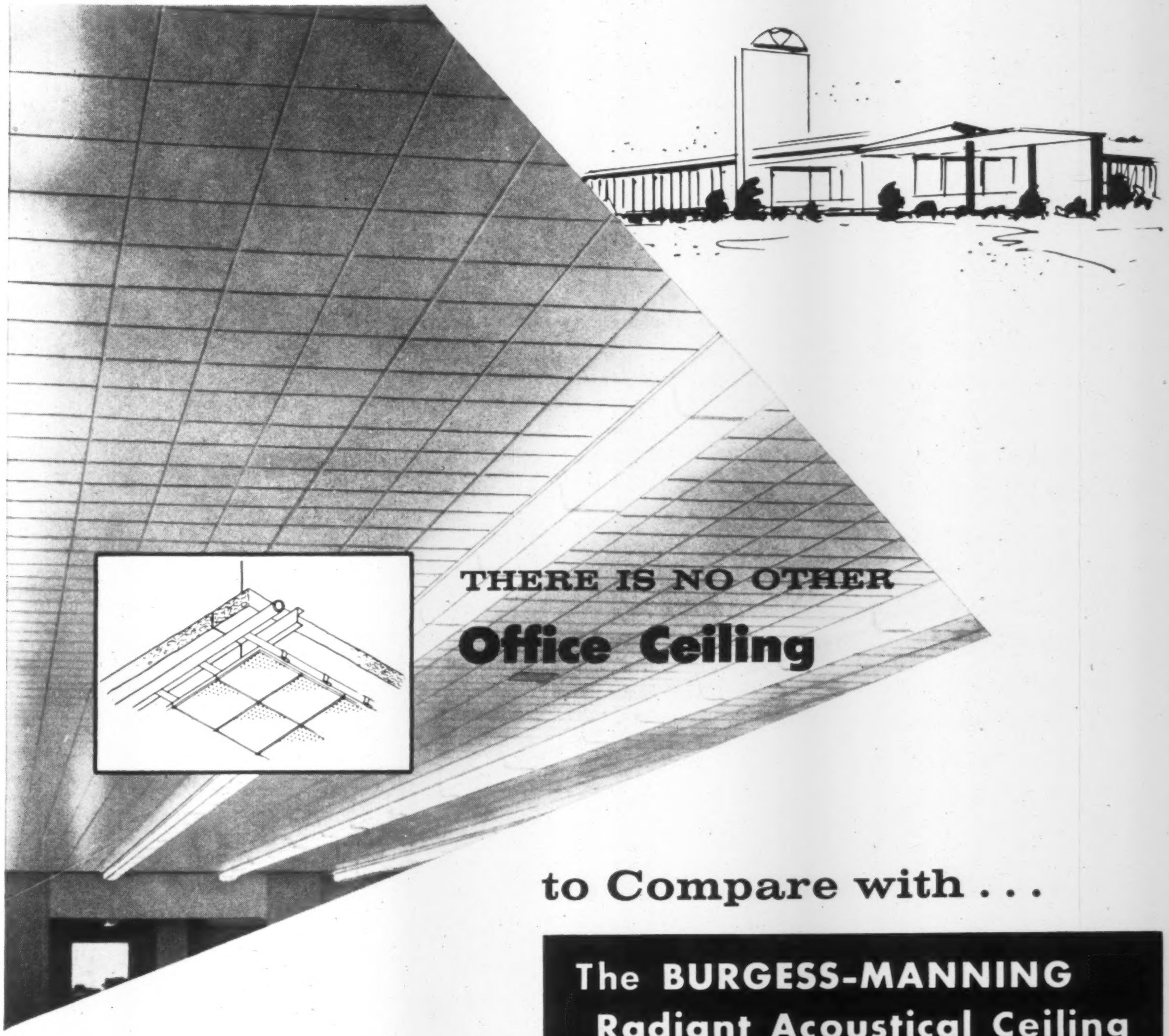

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The only completely integrated Radiant Acoustical Ceiling

It is the most modern concept in comfort conditioning. It is years past the experimental stage. Its performance has been proved by use in many types of buildings.

The Burgess-Manning Radiant Acoustical Ceiling is the ideal ceiling for any building where human comfort is a first consideration.

Combining thermal comfort conditioning and acoustical control in the same unit, this ceiling performs both functions with equal efficiency. It heats or cools by radiant energy, independent of air movement and does not produce drafts. Room temperatures are always practically uniform from floor to ceiling. With Burgess-Manning Radiant Heating and Cooling human comfort can be maintained with lower than average room temperatures. Where many people are working in the same room, its extreme uniformity of heating and cooling eliminates the hot and cold spots that cause dissatisfaction and complaints.

As economical as it is efficient, the Burgess-Manning Radiant Acoustical Ceiling introduces a new standard of comfort conditioning for commercial buildings.

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3 Heating Cooling Acoustical

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Shaw Panel Radiators distribute a carefully engineered combination of radiant and convected heat that only Nature, at her best, can rival.

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Investigate Shaw Panel Radiators. They are rugged, self-contained steel and copper units, of one-piece-bonded construction, easy to handle and install. Heights are 8" to 26"; lengths 11" to 111". Choice of same end or opposite end tapping on all models facilitates piping economies and proper radiator location. Write today for full information.

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MANUFACTURING COMPANY
201 East Carson St. • Pittsburgh, Pa.

RECENT TRADE LITERATURE

Continued

ferred Utilities Mfg. Corp., Dept. HPAC, 1860 *Broadway, New York* 23.

▶ *STEAMBOILER PLANTS* — New 18 page brochure A-111 describes, illustrates "overdrive" principles and features of "Eclipse" vertical gas-fired steamboiler plants. Features cited: extra reserve capacity, large heating surface, seamless formed shell, vigorous water circulation, ease of cleaning, copper clad fire tubes, efficient heating. *Eclipse Fuel Engineering Co., Dept. HPAC, Rockford, Ill.*

▶ *STOKERS* — Automatic air controlled hopper, bin feed stokers for institutional, commercial, industrial buildings covered in 6 page bulletin. Dimension and capacity tables, drawings, section on panel control boards included. *Will-Burt Co., Dept. HPAC, Orrville, Ohio.*

▶ *STOP CLOCK* — Bulletin PB-691 describes new industrial reset time totalizer, "Cramer Type 691." Descriptions of material, rating, construction specifications, design principles included. *Cramer Controls Corp., Dept. HPAC, Centerbrook, Conn.*

▶ *THERMAL INSULATION* — Booklet describes functions of thermal insulations. Experiments explained that can be performed with samples of "Kaylo" hydrous calcium silicate insulation, core material. *Science Service,* 1719 *N. St., N.W., Washington, D. C.*

▶ *THERMOSTAT ACCESSORIES* — New 4 page bulletin RT-819 contains accessories for electric thermostats and limit controls. Drawings, diagrams of available thermostat cases, devices for adjusting temperature controls, mounting brackets, stuffing boxes featured. *Robertshaw-Fulton Controls Co., Dept. HPAC,* 110 *E. Otterman St., Greensburg, Pa.*

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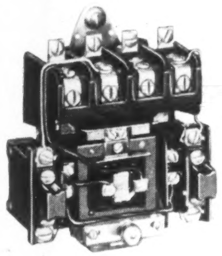
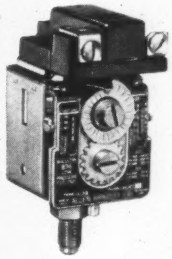
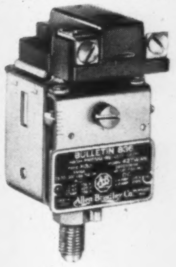
PITTSBURGH 6, PA.



Bulletin 709 solenoid starter, with double break, silver alloy contacts, has only ONE moving part . . . no pins or bearings to corrode and stick. Reliable overload relays.

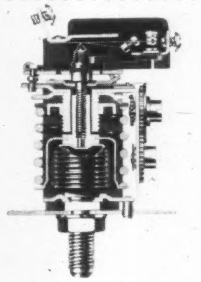


Bulletin 836 pressure switch for steam, air, water, and non-corrosive liquids and vapors, has range from 30 in. of vacuum to 700 psi. Built to industrial control standards.

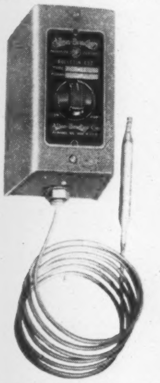


Adjustable high pressure cutout with range and differential adjustments. Snap action precision switch assures opening and closing of pilot circuit —instantly—without hesitation.

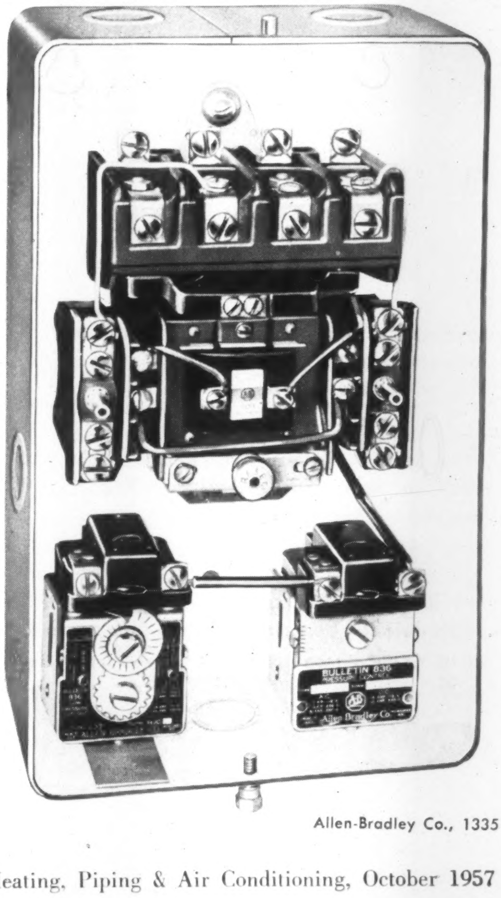
Low pressure cutout is available in 4 ratings: Type 1 has pilot duty rating; Type 2 has intermediate hp rating; Type 3 has a higher hp rating; Type 4 is for d-c operation.



Gas, vapor, or liquid pressure expands the metal bellows against an adjustable spring. The same operating principle applies to both temperature and the pressure controls.



Bulletin 837 temperature control has a bulb containing a volatile liquid whose pressure increases with temperature. The pressure is transmitted to the bellows to open or close the contacts at the predetermined temperature setting.



ALLEN-BRADLEY CONTROLS

are *trouble free*—your assurance of dependable service

At the left is a factory assembled and factory tested special air-conditioning control panel, equipped with high and low pressure cutouts and a Bulletin 709 solenoid starter, providing reliable motor overload protection.

At present labor rates, the cost of a field assembled installation is not low . . . and you have no factory test protection against loose connections, carelessness, etc.

Better let us quote you on the completely assembled panel. Everything considered, it is a low cost investment in a reliable control system for a refrigeration or air-conditioning installation.

Full information is contained in the new 7th edition of the Allen-Bradley Handy Catalog. Please send for a copy.

ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

QUALITY

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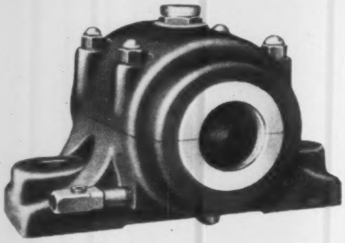
Bright Lights—That Never Fail



SLEEVOIL BEARINGS

Dodge Sleevoil Bearings are available in plain type or water-cooled. They are self-aligning. Can be drilled for thermostatic emergency warning if desired. Shaft sizes from 1-7/16" to 10".

The brilliant lights of Broadway match the stars in the certainty of their rising. A black-out from power failure is almost unthinkable.

One factor that contributes to the dependability of this steady power supply is the bearing that insures unfailing operation of mechanized draft in the generating plant.

These Bearings are Dodge Sleevoil.

Generating plants throughout America—including those in such metropolitan centers as New York, Detroit, San Francisco, Los Angeles—use these super-quality bearings.

The Sleevoil Bearing is a Dodge development, created especially to meet the exacting requirements of fan and blower service. You are invited to write us for our new Engineering Catalog D56, which contains detailed description, sizes, dimensions.

DODGE MANUFACTURING CORP., 1600 Union St., Mishawaka, Indiana

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on modern power transmission machinery for *modern* installations. Look for his name under "Power Transmission Equipment" in your classified telephone directory.

DODGE

of Mishawaka, Ind.

RECENT TRADE LITERATURE

Continued

▶ *TUBE WORKING TOOLS* — Catalog No. 6111 covers tube working tools for flaring, burnishing, double flaring, cutting, bending, joining copper. Rotary type flaring tool featured which has rotary clamping dies for "dialmatic" tube size selection, automatic tube height gage that permits positive flare diameter control, says company. *Weatherhead Co., Dept. HPAC, 128 W. Washington Blvd., Fort Wayne, Ind.*

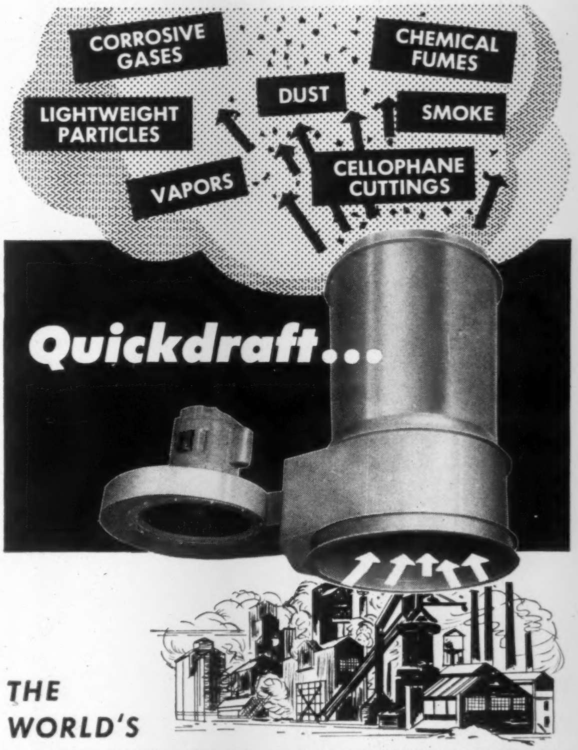
▶ *TURBINE VENTILATOR* — New catalog describes "Centriflo" turbine ventilator. Specifications illustrated with sketches show bearing assembly, rotor blades, rotor ring, suspension assembly, lower radial guide. *Greenheck Fan & Ventilator Corp., Dept. HPAC, Schofield, Wis.*

▶ *VALVES* — New bulletin HB-6 lists construction details, operating characteristics of series "HB Saunders" valves. Sizing data, listing of flow coefficients included. Units incorporate close-coupled design; have diaphragm, cylinder actuators for on-off, throttling control. *Conoflow Corp., Dept. HPAC,* 2100 *Arch St., Philadelphia* 3.

▶ *VALVES* — New 136 page catalog No. 57 covers complete line of bronze, iron body valves. Included are details of renewable seat ring bronze gate valves, composition disc bronze swing check valves, solder end globe valves with drain, modification of 125 lb iron body gate valves. Technical data for initial design of piping layouts consists of table of equivalent resistance of valves, fittings, bends; charts for rational solution of pressure drop for liquids, gases, steam. *Fairbanks Co., Dept. HPAC,* 393 *Lafayette St., New York* 3.

▶ *VALVES* — New 8 page bulletin describes valve prototypes of new designs that meet requirements of water, steam service in nuclear reactors including self-actuated relief valve, check valve, globe valve. Electric pressure transmitter, receiver for liquid level; pressure transmitters for measuring pressure, high temperatures; pressure gages for nuclear energy also covered. *Manning, Maxwell & Moore, Inc., Dept. HPAC,* 250 *E. Main St., Stratford, Conn.*

▶ *VALVES* — New 8 page bulletin V562 contains details of two-position motor valves for heating, air conditioning. Charts give data on operating pressures, dimensions, steam pounds per hour, water capacities. *National Controls, Inc., Dept. HPAC,* 400 *Homer St., Newton Centre* 59, *Mass.*



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★ NEEDS NO STACKS ★ ACID RESISTING VITREOUS ENAMEL FINISH

FOR INDUSTRY, Quickdraft excels in venting paint booths . . . abrasives . . . corrosive gases . . . noxious fumes . . . high temperatures and moisture. Its blower operates in clean or outside air. It eliminates down-time for cleaning and replacing fan blades. It improves industrial venting and reduces maintenance costs!

FOR INSTITUTIONAL AND COMMERCIAL BUILDINGS, Quickdraft efficiently vents heating plants, water heaters and incinerators at roof level. It saves the cost of building unsightly tall stacks.

FOR RESIDENCES, Quickdraft makes low, cold and erratic chimneys function. On and off with the fire, Quickdraft maintains constant draft required for efficient and economical combustion of all fuels. It eliminates pulsating or chattering, puffing, smoking and sooting.

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In addition to standard acid resisting vitreous enamel finish, all Quickdraft units are available in No. 316 Stainless Steel or in rigid Polyvinyl Chloride for withstanding highly corrosive gases. With static pressures up to 12-inches, Quickdraft is ideal for materials handling applications.

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d-h AIR CONDITIONING

SPOTAIRE ROOM-by-ROOM AIR CONDITIONERS: **#1** d-h LRC's: basic unit, concealed or deluxe cabinet; 4 models, 200 thru 600 cfm. **#2** d-h VRC's: concealed or deluxe consoles; 3 models. 200 thru 600 cfm. **#3** d-h HRC's: 3 suspended types, 19 models, 300 thru 1750 cfm.

AIR HANDLING UNITS: **#4** d-h HH Series: ceiling suspended. **#5** d-h HHV Series: floor mounted. Both: 14 models, 624 thru 28000 cfm.

VENTILATING UNITS: **#6** d-h AM: 1752 thru 32250 cfm.

MULTIZONE TYPES: **#7** d-h FLEXAZONE: for simultaneous, independent, variable heating, cooling, ventilating; 1752 thru 32250 cfm.

PACKAGED AIR CONDITIONERS: **#8** d-h AECR: with built-in evaporative condenser. **#9** d-h SCR: with water-cooled condenser. Both, 7½ thru 75 H.P.

PACKAGED STORE COOLERS: **#10** d-h DYNA-PAC & ROYALAIRE: 2 thru 15 tons.

PACKAGED WATER CHILLERS: **#11** d-h CWG: 7½ thru 75 H.P. **#12** d-h CWG-E: attached evaporative condenser. Both 7½ thru 75 H.P.

EVAPORATIVE CONDENSERS: **#13** d-h PERMA-FAN: 13 models; 5 thru 110 tons.

COILS: **#14** Extended surface; steam, water, DX **#15** Type "H"; small applications, DX or chilled water.

PACKAGED WATER CHILLERS: **#16** d-h AC; air cooled. **#17** d-h WC: water cooled. Both, 2, 3, 5 H.P.

COOLING TOWERS: **#18** d-h WMT: 13 models, 5 thru 100 tons.

AIR-COOLED CONDENSERS: **#19** d-h ACC: 5 models, 2 thru 20 tons.

d-h COMMERCIAL REFRIGERATION:

UNIT COOLERS: **#20** d-h FLOCOLD UNIT COOLERS: over 34° F; 11 models; 750 thru 6000 cfm. **#21** d-h FLOCOLD: under 34°F, water defrost, 7 models, 750 thru 6000 cfm. **#22** d-h FLOCOLD: over and under 34° F; water defrost ammonia, 4 models, 2000 thru 6000 cfm. **#23** d-h SPASAVER; WALK-IN BOXES: over 34° F. 7 models, 730 thru 4400 cfm. **#24** d-h HOT SHOT; AUTOMATIC ELECTRIC DEFROST: under 34° F. 6 models, 700 thru 3700 cfm. **#25** d-h HRC; MEAT CUTTING & PACKAGING ROOM UNITS: 14 models, 500 thru 1750 cfm. **#26** d-h FLOCOLD HOT PAN; LIQUOR/MEAT WALK-IN: 8 models, 750 thru 6000 cfm.

PRODUCT COOLERS: **#27** d-h FLOCOLD (FT & CT; FTWD & CTWD; FTAF & CTAF): 9 models; 1314 to 37325 cfm.

REPLACEMENT HOUSING: **#28** d-h SPASAVER: kit to modernize on-job unit coolers.

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DIVISION OF NATIONAL-U. S. RADIATOR CORP
3301 MEDFORD STREET
LOS ANGELES 63, CALIFORNIA
CABLE FORTRADE LOS ANGELES

RECENT TRADE LITERATURE

Continued

▶ *WATER CHILLERS* — Packaged water chillers in 7½, 15, 20, 25, 30, 40, 50, 60, 75 hp models described in new catalog EMT-5715. Feature outlined by company is that units require only chilled water, condenser water, electrical connections. Mechanical specifications, drawings included. *Drayer-Hanson, Div. of National-U.S. Radiator Corp., Dept. HPAC, 3301 Medford St., Los Angeles 63.*

▶ *WATER CHILLERS* — New sizes, combinations of automatic hermetic water chilling units for air conditioning, refrigeration systems covered in 64 page catalog. Information given on "CenTraVac" operation, general features, lubrication, selection, capacities, water pressure drop, heat transfer, control system, roughing-in dimensions, piping, mechanical engineering specifications. *Trane Co., Dept. HPAC, LaCrosse, Wis.*

▶ *WELDING EQUIPMENT* — New 8 page bulletin describes various types of welding equipment. Examples show how welding units are utilized at nine locations. Illustrations included. *Linde Co., Div. of Union Carbide Corp., Dept. HPAC, 30 E. 42nd St., New York 17.*

+

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INFORMATION

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JANUARY DIRECTORY ISSUE

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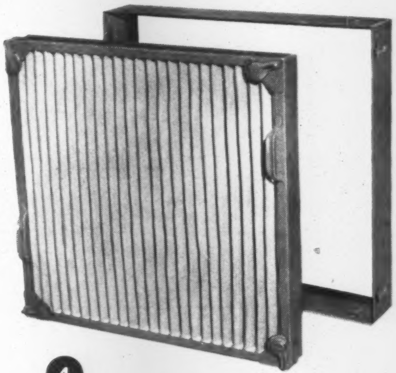

4

Which Staynew Filter for Your Air Filtration Job?

Among the complete line of industrial and ventilating filters offered by Dollinger, you will find one that meets your requirements, exactly. Illustrated are:

1. **Staynew Automatic Air Filter**—A hands-off, self-cleaning filter for heavy duty application that reduces maintenance costs and shut-down time to a minimum. An exclusive feature provides double filtering action . . . positive protection against oil entrainment in the air stream. Write for Bulletin 500.
2. **Electro-Staynew Precipitator**—Removes 90% of all air-borne dirt, smoke, dust, pollen and oil mist. A completely self-contained unit. Write for Bulletin 400.
3. **Viscous Panel Filter**—Low cost, permanent, washable . . . for locations where extreme efficiency is not required. Large capacity, easy to clean. Write for Bulletin 700.
4. **Dry Panel Filter**—Highly efficient for heavy duty work. Preformed filtering material quickly and easily changed. Write for Bulletin 600.

Write for Bulletins which describe in detail the filters illustrated. We also design all types of special filters. Consult Dollinger engineers . . . no obligation. Dollinger Corporation, 9 Centre Park, Rochester 3, N. Y.

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WHO'S WHAT . . .

(New personnel, promotions)

▶ *STONE & WEBSTER ENGINEERING CORP.* — Fred W. Argue and Edward J. Ford, directors. They are vice president-engineering manager and vice president-senior construction manager, respectively.

▶ *WEBSTER ENGINEERING CO.* — George C. Bergtholdt, vice president.

▶ *PITTSBURGH COKE & CHEMICAL CO.* — Norman T. Shideler, president of Insul-Mastic, Inc., a newly acquired subsidiary; Arthur E. Gray, general manager of protective coatings division.

▶ *YOUNGSTOWN SHEET AND TUBE CO.* — Ernest W. Polley, chief chemist in Youngstown district; Fred E. Theis and Norman P. Hitchcock, shops and maintenance-power superintendents, respectively, at Indiana Harbor works.

▶ *E. I. DU PONT DE NEMOURS & CO.* — Charles H. Topping, elected president of Building Research Institute. Mr. Topping is senior architectural and civil consultant for company.

▶ *NATIONAL VALVE AND MFG. CO.* — R. W. Fink, chief engineer; James B. Valdesalice, chief project engineer; H. F. Huettner, manager of counterpoise hanger department. At Etna, Pa., works: William J. Dames, superintendent; Willard S. Alter, assistant superintendent.

▶ *BOHN ALUMINUM & BRASS CORP.* — Wesley H. Markson, assistant to general manager, Betz Div.

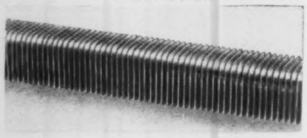
▶ *YUBA INDUSTRIES, INC.* — George Evans, assistant to vice president in charge of sales for Yuba Consolidated Industries; Robert A. Beck, general sales manager for heat transfer division; Robert H. Shaw, sales manager of eastern division.

▶ *BROOKS ROTAMETER CO.* — George D. Keller, chief engineer.

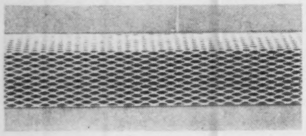
▶ *BALDWIN-HILL CO.* — Harold L. Humes, elected vice president of Building Research Institute. Mr. Humes is vice president of company.

▶ *DRESSER MFG. DIV., DRESSER INDUSTRIES, INC.* — Lyman D. Warner, manager of subsidiaries which includes Dresser Mfg. Ltd. of Toronto, foreign business activities including Dresser England, special products department of Dresser Mfg. Div. at Bradford, Pa.

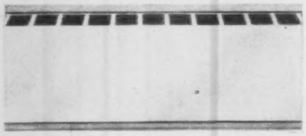
WITHOUT COVER



WITH EXPANDED METAL COVER

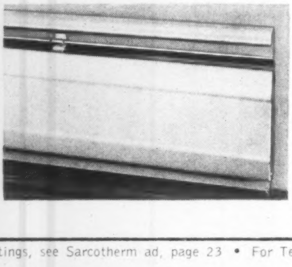


WITH FLAT TOP COVER



WITH SLOPING TOP COVER

BASEBOARD



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APPROVED RATINGS — as established by Institute of Boiler and Radiator Manufacturers for finned-tube and baseboard radiation.

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FOR UNDIVIDED RESPONSIBILITY — specify and order from one "Complete Line" source . . . SARCO-SARCOTHERM . . . finned-tube radiation, heating specialties, pumps, temperature regulators, and weather-compensated control systems.

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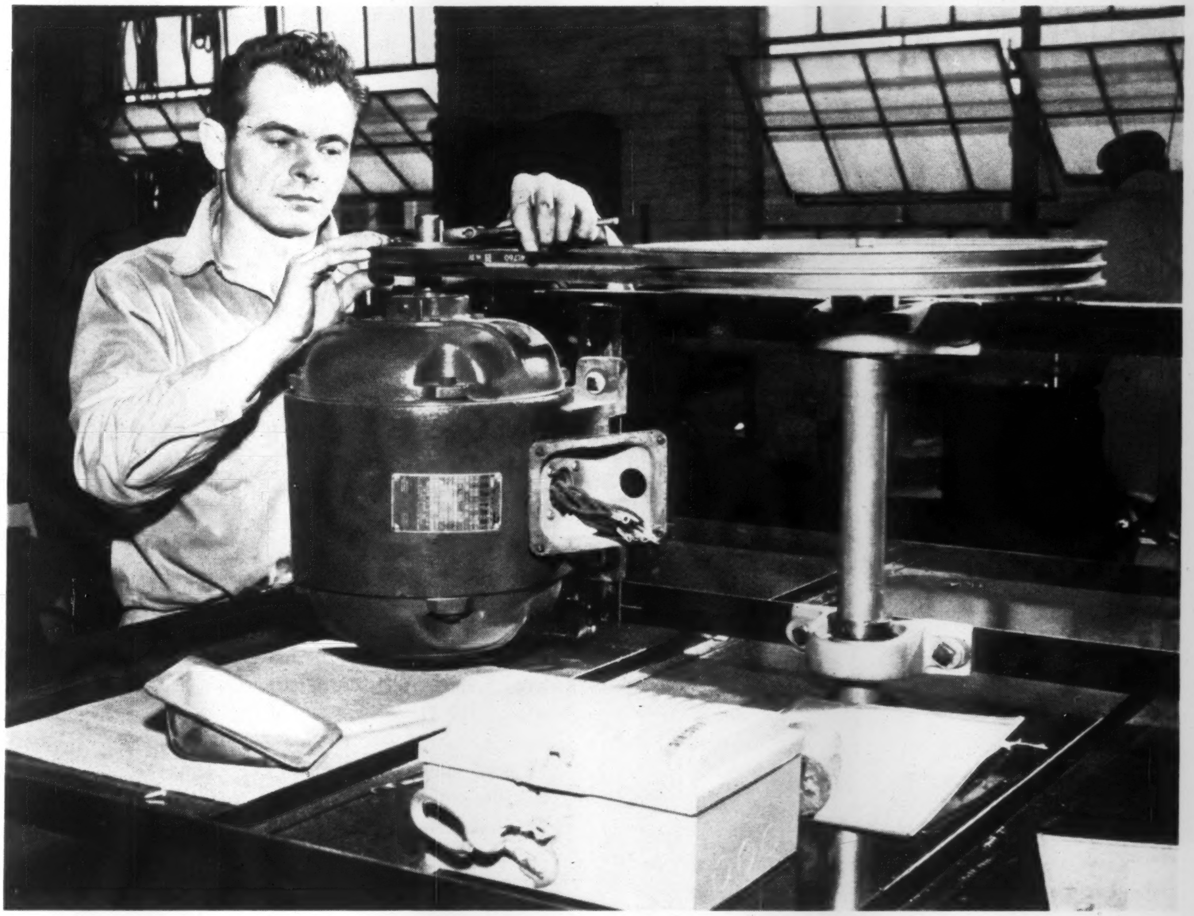
2227-F

For Balancing Fittings, see Sarcotherm ad, page 23 • For Temperature Regulators, See Sarco ad, page 25



AT PENN VENTILATOR COMPANY

DIEHL motors increase product dependability

Operating dependability is an inherent feature of the power-roof ventilators made by Penn Ventilator Company, Philadelphia, Pa. Usually, these ventilating units are installed in locations completely exposed to the elements and relatively inaccessible for regular servicing. Failure in operation, however, could halt an important manufacturing operation or even cause complete plant shut-down. Hence, every detail in the design and construction of Penn Ventilators is considered with a view to the assurance of uninterrupted operation for long periods of time with a minimum of maintenance.

This is one of the reasons why Penn Ventilator Company has consistently selected DIEHL motors for its equipment. James T. Ellington, Penn Director of Purchases says: "We can't gamble with an inferior unit—a reliable motor is a necessity! DIEHL motors are trouble-free and well suited to all our requirements."

Here is another example of how DIEHL has co-operated with a progressive manufacturer to build a product of highest quality and proved reliability. With almost three quarters of a century of experience in the design and manufacture of motors, DIEHL is well equipped to help you solve your motor problems. We'll work closely with you to provide the right motor—at the right time—at the right price.

Diehl

DIEHL MANUFACTURING COMPANY
Electrical Division of
THE SINGER MANUFACTURING COMPANY
Finderne Plant, SOMERVILLE, N. J.

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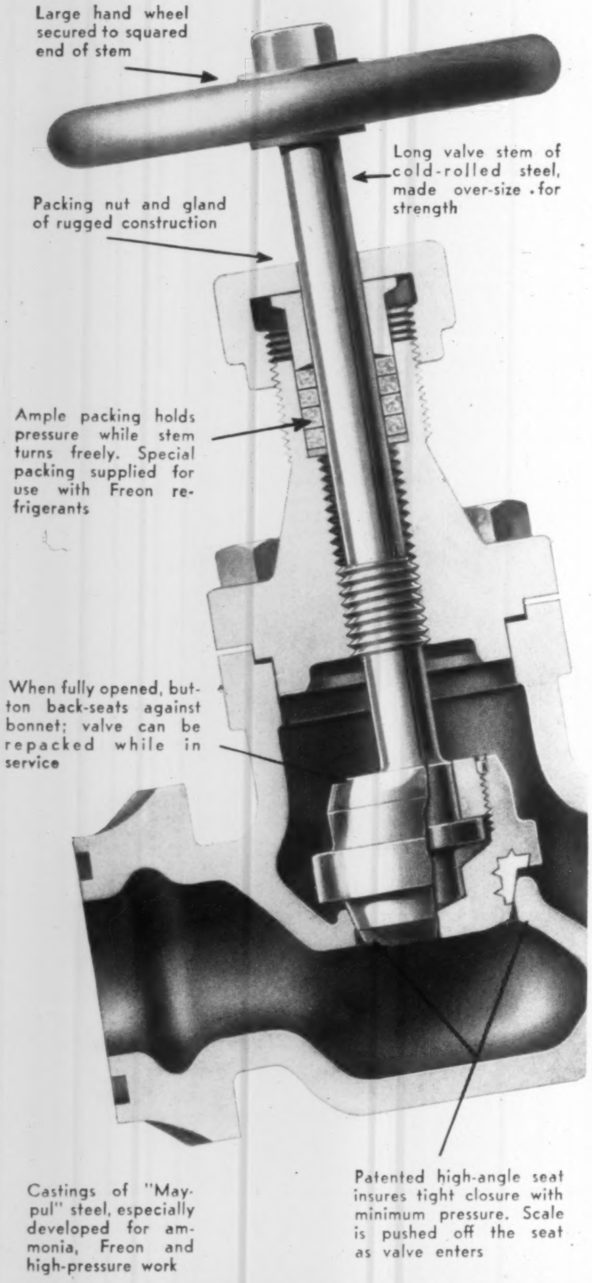
FRICK TRADE MARK **Valves are Superior for Refrigeration and Other High-Pressure Services**


Large hand wheel secured to squared end of stem
Long valve stem of cold-rolled steel, made over-size for strength
Packing nut and gland of rugged construction
Ample packing holds pressure while stem turns freely. Special packing supplied for use with Freon refrigerants
When fully opened, button back-seats against bonnet; valve can be repacked while in service
Castings of "Maypul" steel, especially developed for ammonia, Freon and high-pressure work
Patented high-angle seat insures tight closure with minimum pressure. Scale is pushed off the seat as valve enters

DEPENDABLE REFRIGERATION SINCE 1882
FRICK CO.
WAYNESBORO, PENNA., U. S. A.

WHO'S WHAT

Continued

▶ *RELIANCE ELECTRIC & ENGINEERING CO.* — Robert O. Gee, manager of application engineering; George E. Law, manager of service; William C. McConnell, manager of general products; Anthony P. DiVincenzo, manager of control engineering; John J. Dailey, Jr., manager of control manufacturing at Euclid plant. Frank R. Terrant, assistant manager, Ivanhoe division.

▶ *ROBERTS-GORDON APPLIANCE CORP.* — Joseph L. Ulman, chief engineer.

▶ *MINNEAPOLIS-HONEYWELL REGULATOR CO.* — George W. Hoffmeister, general superintendent of new plant at Fall River, Mass.

▶ *DODGE MFG. CO.* — Carl K. Shank, works manager; Edwin Rhodes, purchasing agent; Richard Kaiser, plant engineer.

▶ *AIRTEMP DIV., CHRYSLER CORP.* — New sales management group consists of six directors. They are: T. B. Hollencamp, national service; M. T. Bard, branch operations; R. B. Stotz, Airtemp Construction Div.; Sydney Anderson, Jr., zone operations; A. J. Schiffmann, national accounts and government sales; M. B. Smith, sales planning. Three managers are: J. A. Clarke, dealer development commercial-residential air conditioning and heating; H. A. Dillon, dealer development room air conditioners; J. C. Davidson, technical services.

▶ *WOLVERINE TUBE, DIV. OF CALUMET & HECLA, INC.* — Jack H. Smith, manager of sales division districts.

▶ *BURNS AND ROE, INC.* — Thomas Y. Mullen, chief mechanical engineer for power projects; Martin A. Mayers, chief mechanical engineer for special projects.

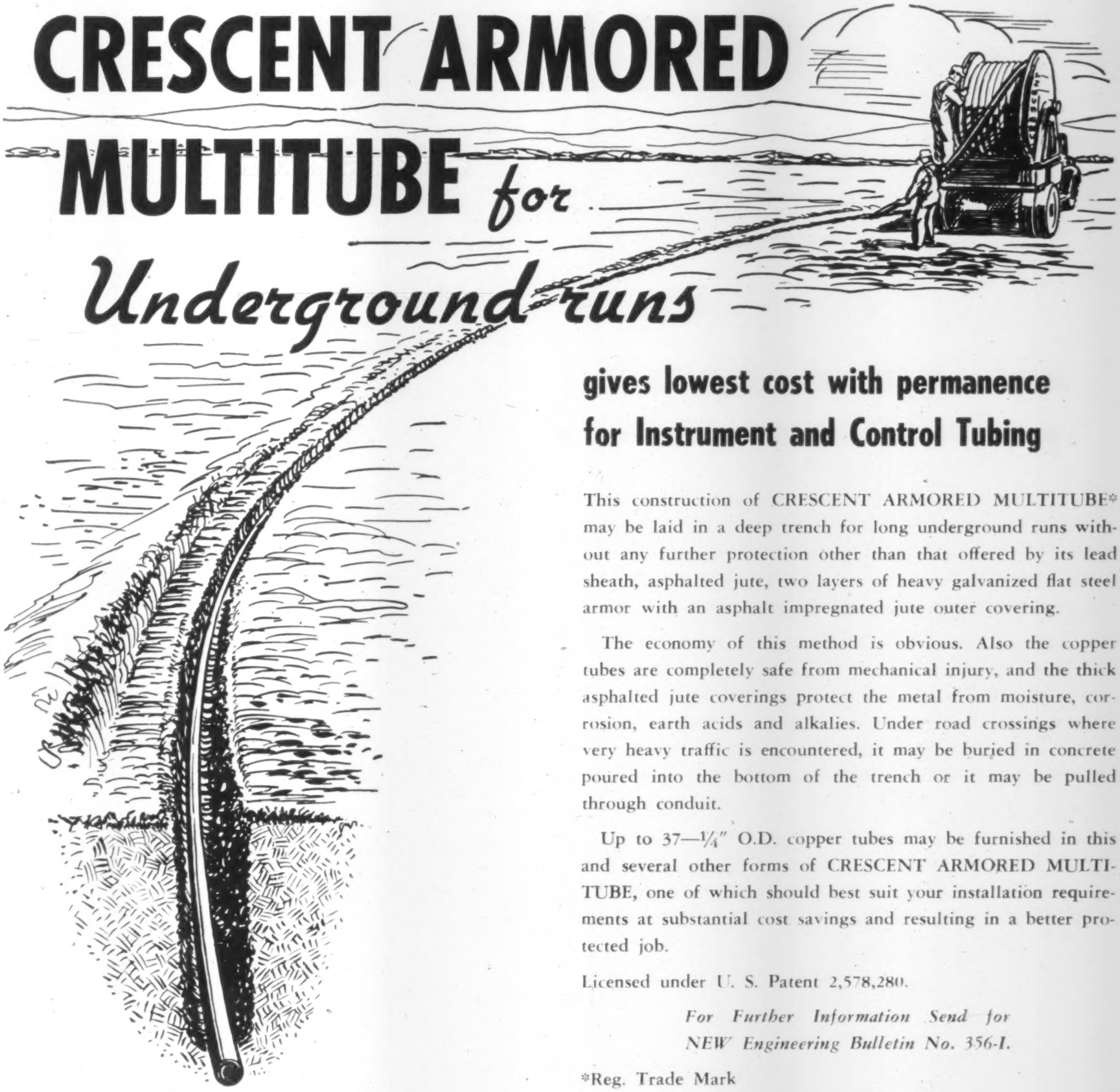
▶ *WESTINGHOUSE-ELECTRIC CORP.* — David C. Fulton, manager of heat transfer apparatus department for steam division; William B. Cott, assistant to vice president, air conditioning division.

▶ *TRANTER MFG., INC.* — C. P. Yoder, director of product research and development department; Bob Saxton, assistant general sales manager.

▶ *SWARTWOUT CO.* — Lyle L. Groff, manager of roof ventilator sales.

▶ *SPORLAN VALVE CO.* — J. D. Boing, appointed to sales department.

CRESCENT ARMORED MULTITUBE *for* *Underground runs*



gives lowest cost with permanence for Instrument and Control Tubing

This construction of CRESCENT ARMORED MULTITUBE* may be laid in a deep trench for long underground runs without any further protection other than that offered by its lead sheath, asphalted jute, two layers of heavy galvanized flat steel armor with an asphalt impregnated jute outer covering.

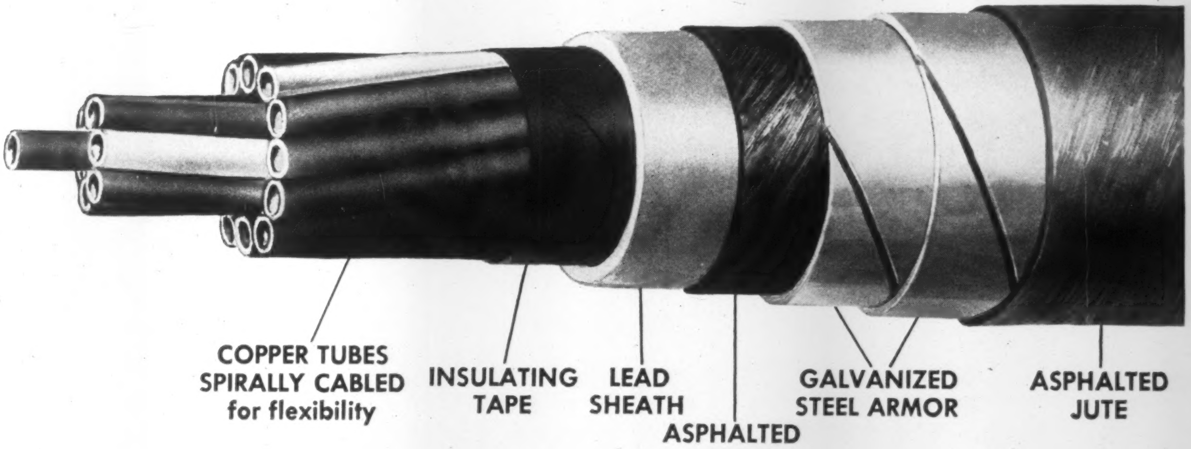
The economy of this method is obvious. Also the copper tubes are completely safe from mechanical injury, and the thick asphalted jute coverings protect the metal from moisture, corrosion, earth acids and alkalies. Under road crossings where very heavy traffic is encountered, it may be buried in concrete poured into the bottom of the trench or it may be pulled through conduit.

Up to 37—¼″ O.D. copper tubes may be furnished in this and several other forms of CRESCENT ARMORED MULTITUBE, one of which should best suit your installation requirements at substantial cost savings and resulting in a better protected job.

Licensed under U. S. Patent 2,578,280.

For Further Information Send for NEW Engineering Bulletin No. 356-I.

*Reg. Trade Mark



CRESCENT INSULATED WIRE AND CABLE CO.
TRENTON, NEW JERSEY

WHO'S WHAT

Continued

▶ *STODDARD INDUSTRIES, INC.* — George H. Cantrell, sales manager.

▶ *INTERNATIONAL NICKEL CO., INC.* — C. M. Schwitter, head of market research activities, assisted by George Hoobler.

▶ *CHASE BRASS & COPPER CO.* — John L. Cotsworth, staff manager, stainless steel; Robert H. Chittim, assistant staff manager, tube.

▶ *MARSH INSTRUMENT CO.* — Robert E. Barnett, sales manager.

▶ *BURNHAM CORP.* — Walter H. Sampson, marketing manager, heating and cooling division.

▶ *A. M. BYERS CO.* — Morton M. Jenkins, steel sales metallurgist; Norbert J. Connors, steel sales department.

▶ *BABCOCK & WILCOX CO.* — James J. Barrett, manager of extrusion sales for tubular products division.

▶ *ARMSTRONG CORK CO.* — J. P. Sawyer, manager of low temperature insulation and insulating refractories sales; F. S. Donnelly, Jr., manager of "Armaflex" sales, market research, new product development.

▶ *BORG-WARNER INTERNATIONAL CORP.* — Marshall A. Haislup, industrial sales manager.

▶ *PHILIP CAREY MFG. CO.* — Robert J. Littin, merchandising manager in insulation division.

IN THE TERRITORIES . . .

(Recent sales appointments)

▶ *WORTHINGTON CORP.* — William C. Cheek, midwest region sales manager; John H. Loomis, manager of Chicago district office; Hollis H. Wise, St. Louis district manager.

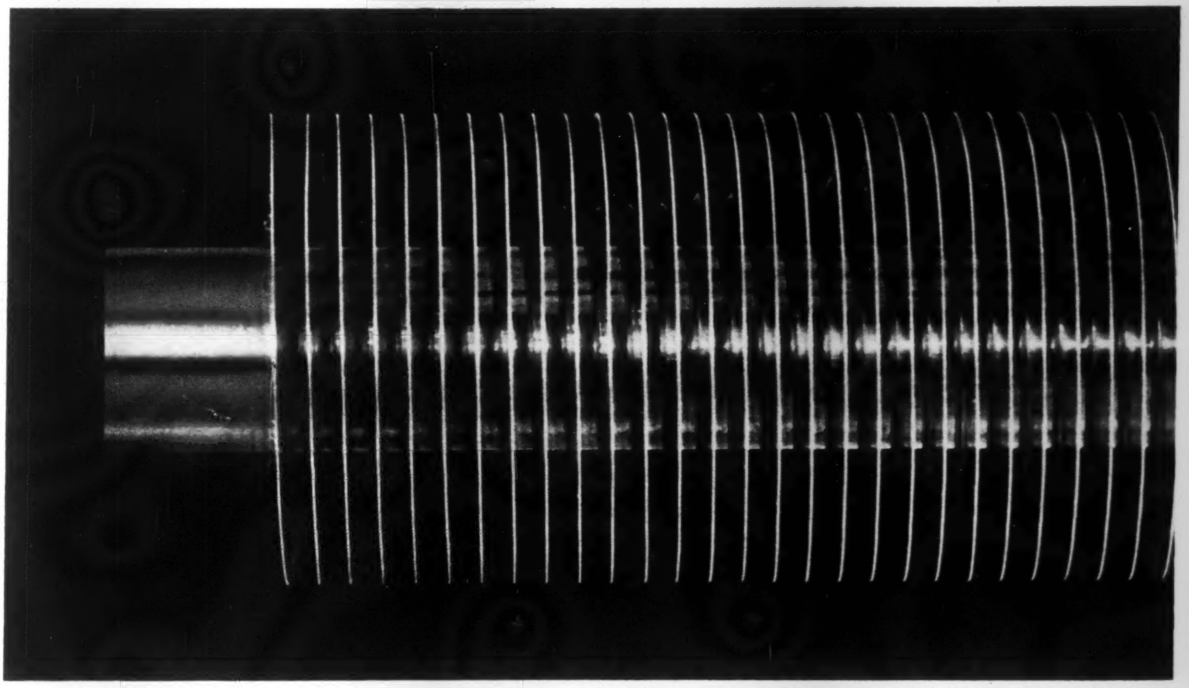
▶ *INSULATION DIV., ARMSTRONG CORK CO.* —Arthur R. Conaty, branch manager at new Elizabeth, N. J., office. Salesmen assigned there are: Hugh N. March, P. L. Biegler, C. E. Geigel.

• CONVECTORS
• BASEBOARD
• BOILERS
• FIN TUBE
Embassy STEEL PRODUCTS INC

HEATING EQUIPMENT BY EMBASSY

WRITE FOR FREE CATALOGS
DEPT. HP

EMBASSY STEEL PRODUCTS, INC.
890 STANLEY AVE. • BROOKLYN 8, N. Y.



AEROFIN Smooth-Fin Coils offer you

Greater Heat Transfer

per sq. ft. of face area

Lower Airway Resistance

—less power per c.f.m.

Aerofin smooth fins can be spaced as closely as 14 per inch with low air friction. Consequently, the heat-exchange capacity per square foot of face area is extremely high, and the use of high air velocities entirely practical. Tapered fin construction provides ample tube-contact surface so that the entire fin becomes effective transfer surface. Standardized encased units arranged for simple, quick, economical installation.

Greater Capacity
Less Air Resistance
with AEROFIN
Smooth-Fin
Heating and Cooling Coils

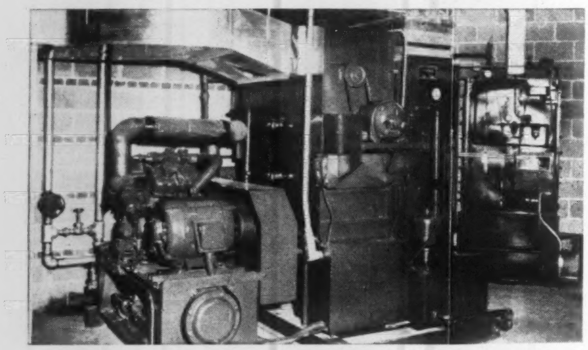
Write for Bulletin S-55

AEROFIN CORPORATION

101 Greenway Ave., Syracuse 3, N. Y.

Aerofin is sold only by manufacturers of fan system apparatus. List on request.

DRY AIR...
PRECISELY as you want it



NIAGARA CONTROLLED HUMIDITY AIR CONDITIONING

This method removes moisture from air by contact with a liquid in a small spray chamber. The liquid spray contact temperature and the absorbent concentration, factors that are easily and positively controlled, determine exactly the amount of moisture remaining in the leaving air. Heating or cooling is done as a separate function.

The Niagara's Controlled Humidity Method using HYGROL moisture-absorbent liquid is

Best and most effective because . . . it removes moisture as a separate function from cooling or heating and so gives a precise result constantly and always.

Most reliable because . . . the absorbent is continuously reconcentrated automatically. No moisture-sensitive instruments are required to control your conditions.

Most flexible because . . . you can obtain any condition at will and hold it as long as you wish in either continuous production, testing or storage.

Easiest to take care of because . . . the apparatus is simple, parts are accessible, controls are trustworthy.

The cleanest because . . . no solids, salts or solutions of solids are used and there are no corrosive or reactive substances.

AT THE
CHEMICAL SHOW
26th EXPOSITION OF CHEMICAL INDUSTRIES
Coliseum, New York City, December 2 – 6, 1957
See NIAGARA . . .
AIR CONDITIONERS • *Aero* HEAT EXCHANGERS
Aero AFTER COOLERS • *Aero* REFRIGERANT
CONDENSERS • *Aero* STEAM CONDENSERS
Aero VAPOR CONDENSERS • HUMIDIFIERS
HEATERS • COOLERS • DRYERS
BOOTH No. 655

Write for full information; ask for Bulletins 112 and 121. Address Dept. HP-10

NIAGARA BLOWER COMPANY
405 Lexington Ave., New York 17, N. Y.
District Engineers in Principal Cities of U.S. and Canada

WHO'S WHAT

Continued

▶ *AIRTEMP DIV., CHRYSLER CORP.* — Managers in each of five new zones are: N. F. Foulds, northeast; Warren Fitch, southeast; Harry P. Young, midcentral; F. G. Hill, southwest; E. D. Dickson, west coast. Dealer-development supervisors in the respective zones are: E. O. Butler, R. J. Link; W. L. Regan; Dean Parke, L. C. Smith; J. J. McMahon; R. H. Friedel. Dealer-development specialists in the respective zones are: W. F. Poller, R. E. Nutting, H. L. Kerr, L. W. Barron; G. W. Lunsford, E. F. Voss, C. H. Stephan; B. P. O'Donnell, C. J. Otis, J. J. Casey; J. P. Kelley, A. B. Moore, J. G. Blackmon; R. B. Hamilton, J. L. Floyd, K. P. Whitney, M. E. Barker; G. B. Sharkey, P. B. Lockwood, M. L. Franzel.

▶ *WOLVERINE TUBE, DIV. OF CALUMET & HECLA, INC.* — New sales managers are: F. F. Moore, Jr., eastern district; Richard B. Flynn, east central district. New sales representatives are: George F. Wallace, northern Texas, Oklahoma; James P. Moore, Kansas City; Robert Allan, Grand Rapids, Mich., and vicinity.

▶ *AMERICAN AIR FILTER CO., INC.* — C. J. Gaspar, eastern regional sales manager for all company products; Frank A. Stanton and Dale D. Briggs, middle Atlantic states and central states supervisory sales engineers, respectively, for Herman Nelson unit ventilating products; W. N. Murray, manager of Boston branch office. Mr. Murray replaces Robert E. Reid, named special sales engineer at the Boston office.

▶ *WIREMOLD CO.* — Representatives of Air Duct Div. and territories they will serve are: Pearsall Co., Colorado, Wyoming; Air Products Equipment Co., Illinois, Indiana; Kenyon-Barstow Co., Massachusetts, New Hampshire, Rhode Island, Vermont.

▶ *UNITARY EQUIPMENT DIV., CARRIER CORP.* — Serving as distributor for air conditioning and refrigeration products in Long Island is Designed Weather Distributors, Inc.

▶ *TORRINGTON MFG. CO.* — William E. Cashen, sales representative in midwest, Air Impeller Div. Headquartered in Dayton, Ohio, Mr. Cashen will direct sales, engineering services in southern Ohio.

▶ *RECOLD CORP.*— L. R. Gorrell Co. has opened new branch office in Charlotte, N. C., headed by Emil Shearon. The Gorrell firm represents Recold in that area.

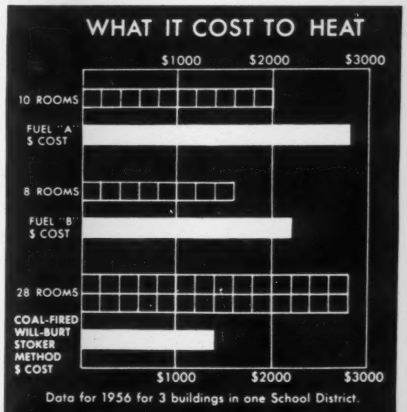
SAVES $1500!

SCHOOL SYSTEM USING 3 DIFFERENT FUELS PROVES ECONOMY OF WILL-BURT COAL-FIRED STOKERS

There has to be a sound reason for savings like these — and lower initial fuel cost *is* one reason.

More important is *efficient use of fuel — and* Will-Burt Air Controlled Stokers, as are used here, continuously and automatically regulate air supply according to fuel bed requirements. Efficient firing is assured, without close manual supervision, saving both time and fuel. A Will-Burt Panel Board (see inset) with limit and programming controls, makes this installation virtually self-operating.

Write for brochure, "The Logic of Stoker Heating." Engineering and advisory service available.



DALTON HIGH SCHOOL, a 28-room building, heated during an average year for only $1445.99 — using Will-Burt Stoker-fed coal heat. Will-Burt Panel Board shown adds to automatic control.

The **WILL-BURT** *Company* ORRVILLE • BOX 902 • OHIO

Our twenty-eighth year in the stoker business.

★ ★ ★

Address Changing? Tell Us At ONCE!

A postal regulation relating to the handling of undelivered mail could result in some issues of *Heating, Piping & Air Conditioning* being thrown away instead of being returned to us — as they have been in the past — for remailing to your new or correct address.

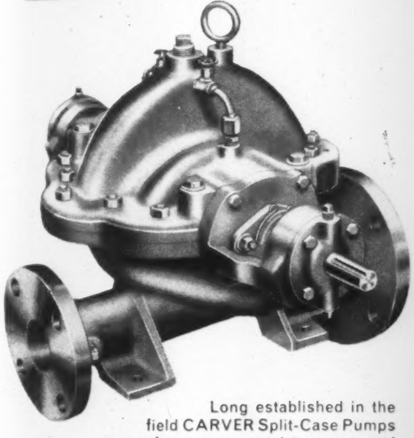
To avoid missing any issue of *Heating, Piping & Air Conditioning* it is more important than ever to report both your new and old address to us and your post office. Deadline is the 8th of the preceding month for the next issue. Send changes — and new local postal delivery zone — to

HEATING, PIPING &
AIR CONDITIONING
6 N. Michigan Ave.,
CHICAGO 2, ILL.

★ ★ ★

QUALITY in Double-Suction Split-Case Pumps

PRICED to meet all competition!



Long established in the field CARVER Split-Case Pumps are performance-proved in every way!

Ask for Complete Information

★ NOW . . . figure CARVER Split-Case Pumps in on any job . . . they offer quality and *proved performance* at a *price that is under or competitive* with all others!

★ NEW and IMPROVED, *with double-suction in all sizes,* these CARVER Pumps have all the desirable features of Split-case pumps. Line includes the popular 3500 RPM units.

★ Designed for either mechanical seals or packed stuffing boxes.

★ Capacities up to 3500 GPM. Heads up to 340 ft.

CARVER PUMP COMPANY
1460 Hershey Ave., Muscatine, Iowa

CARVER

WHO'S WHAT

Continued

▶ *MURRAY IRON WKS. CO.* — L. J. Prues and Assoc. has opened new San Francisco office with William McCumber as manager. Prues is Murray Iron Wks. Co. representative.

▶ *THERMOBLOC DIV., PRAT-DANIEL CORP.* — Serving as sales engineering representatives are: Peerless Utah Co., Salt Lake City; Tom C. Brady Co., Denver; McGinnis-Hill Co., Knoxville; J. P. Ashcraft Co., Dallas.

▶ *JACKSON AND CHURCH CO.* — L. J. Prues and Assoc. has opened new San Francisco office with William McCumber as manager. Prues is Jackson and Church Co. representative.

▶ *R-P&C VALVE DIV., AMERICAN CHAIN & CABLE CO., INC.* — C. M. Hause and E. P. Newsted, district sales managers, Los Angeles and San Francisco districts, respectively.

▶ *BUENSOD-STACEY, INC.* — Sales representatives are D. E. McCulley Co., Omaha, and A. J. Hamilton, Bridgeport, Conn.

▶ *TUBE TURNS, DIV. OF NATIONAL CYLINDER GAS CO.* — S. Merle Hardison, district manager in Philadelphia. Mr. Hardison replaces W. E. Geiser who has been assigned to company's expansion program.

▶ *SPENCER THERMOSTAT DIV., METALS & CONTROLS CORP.* — I. Eugene Slawson, field engineer in western Michigan section of Detroit district.

▶ *TRANE CO.* — William Graham, Jr., manager of eastern sales region; Robert W. Thomas, manager of New York office.

▶ *NATIONAL-U.S. RADIATOR CORP.* — Theodore J. Williams, manager of Indianapolis branch office for heating and air conditioning division.

▶ *McQUAY, INC.* — Richard S. Vinsant, representative for heating and air conditioning products in Arkansas.

▶ *POWERS REGULATOR CO.* — Robert Tustison, engineer in charge of new Green Bay, Wis., factory branch office.

▶ *RELIANCE ELECTRIC & ENGINEERING CO.* — John L. VanNort, midwest regional sales manager.

Especially Engineered to Permit . . .

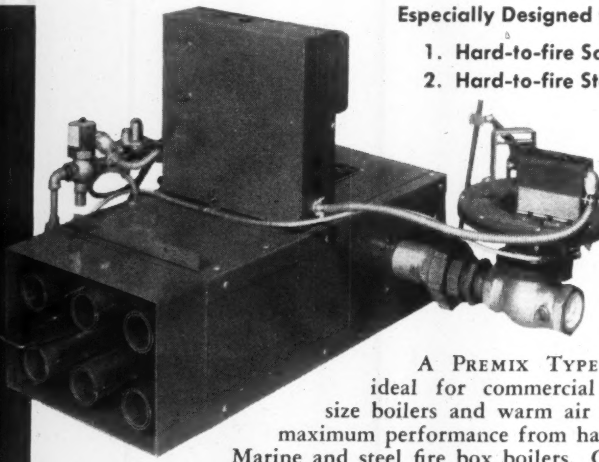
HIGH FIRING RATES at HIGH EFFICIENCY

MULTURI (MULTIPLE VENTURI) BURNERS

- Formed steel mixers, finished for corrosion resistance, offer minimum resistance to mixture flow, result in uniform high capacity.
- High temperature resisting stainless steel flame retainers insure flame stability over a wide capacity range.
- Mixer design produces a hot clear flame, results in high combustion efficiency with minimum excess air.

Especially Designed for . . .

1. **Hard-to-fire Scotch Marine Boilers**
2. **Hard-to-fire Steel Fire Box Boilers**



Multuri Burners available in standard units, 4 to 54 mixers. Capacities 700,000 to 10,800,000 BTU/hr. Higher capacities can be furnished.

A PREMIX TYPE GAS BURNER, ideal for commercial and industrial size boilers and warm air furnaces. Gives maximum performance from hard-to-fire Scotch Marine and steel fire box boilers. Controlled flame characteristics make the burner a natural for units with extensive refractory surface. Suitable for any gas at 4" gas pressure or more. Permits high firing rates at high efficiency. Simple to install, adjust, and operate. Completely Factory Wired and Assembled — Ready for Immediate Installation !

Write for detailed information—or for a questionaire listing all the data necessary for correct specifications and efficient installation.

GORDON

GAS HEATING EQUIPMENT

ROBERTS-GORDON

DEPT. HPAC BUFFALO 6, N. Y.

FURNACES • COOLING UNITS • BOILERS • UNIT HEATERS • GAS BURNERS

here's SOUND ADVICE on *effective* ROOF VENTILATORS

PENN
DOMEX
ROOF
EXHAUSTERS..

Specified recently by
AMERICAN EMBASSY
BAGHDAD, IRAQ

.. feature .. Skyline Stylishness .. High Performance .. and durable, bright aluminum housings.

Domexes recent development is the "Significant Scroll", a deep, one-piece spun inlet — exclusive with Penn RB and QB series — providing *proper design*, quiet operation and certified capacities ..

and for SOUND CONTROL specify

PENN'S
SONOTROL
SOUND BARRIER
CURB

.. A factory fabricated roof curb combining structural stability and sound attenuating quality definitely superior to field constructed curbs. The Sonotrol is priced competitively with on-the-job constructed curbs, it also defines and stabilizes dimensions. It is an excellent companion piece for all motor driven exhausters. The Penn Ventilator Man in your area has complete details. Contact him for a copy of the Electrical Testing Laboratories' report on the Sonotrol Curb.

Detailed information on the Domex and Sonotrol Curb is available from your local representative or write direct.

PENN VENTILATOR CO.
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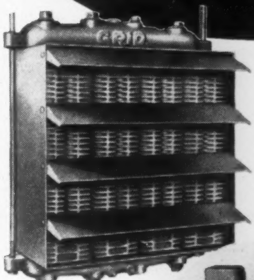
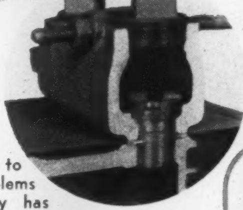
Representatives and Distributors in Principal Cities.
Member of Power Fan Manufacturers' Association.

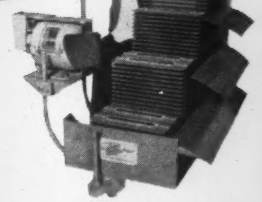
GRID Cast Iron-Steam Heat Transfer Surface*



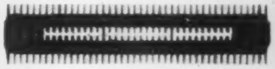
*...ends Unit Heater Maintenance Problems!



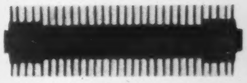
Your answer to unit heater problems general industry has discovered through common failures of copper, aluminum and steel tube heat transfer surface. GRID condenser eliminates internal electrolytic corrosion—because all metals in contact with steam are similar. GRID also eliminates external corrosion—because the cast iron construction resists acid or other fumes in the air and eliminates the use of reducing valves where high steam pressure is used. GRID cast iron construction is tested to withstand steam pressures up to 250 P.S.I. . . .450° temperature. . .no soldered, brazed, welded or expanded connections. . .a specially designed threaded nipple provides a leakproof joint. GRID eliminates the high maintenance costs generally experienced with other types of condenser construction. . .eliminates replacement costs because GRID is built to last for years . . .uninterrupted service records of more than twenty years are common among GRID users.



Cut-away view of Model 2000 GRID Unit Heater . . . note double steam chambers in each fin section and wide fin spacing.



Note wide fin spacing and ample radiation surface in all cast iron, one-piece, single chamber fin sections, used in Models 1000 and 1200 GRID Unit Heaters.



All cast iron, one-piece, double chamber fin sections used in Models 1500 through 3000 GRID Unit Heaters . . . wide fin spacing prevents clogging and is easily cleaned.

Send for the complete story on GRID Unit Heaters, GRID Blast Heaters and GRID Radiation for general industry use. . .It is contained in GRID Products Catalog No. 956. Write today for your copy.

D. J. MURRAY MANUFACTURING CO.
MANUFACTURERS SINCE 1883
WAUSAU, WISCONSIN

WHO'S WHAT

Continued

▶ *TUBE TURNS PLASTICS, INC.* — Joseph S. McCulloch, northeast district manager. Mr. McCulloch will be headquartered in Riderwood, Md.

▶ *DUNHAM-BUSH, INC.* — Primo Bordingnon, sales engineer, south Chicago territory.

▶ *SUPERIOR VALVE & FITTINGS CO.* — New sales representatives are Harco, Inc. for southwest territory, and C. L. Bensen for Minnesota, Iowa, North and South Dakota.

▶ *ATLAS VALVE CO.* — Robert H. White, sales representative for northern New Jersey territory, headquartered in Newark.

▶ *OLIN MATHIESON CHEMICAL CORP.* — Regional sales managers of new Aluminum Div. offices are: John M. Welch, Chicago; Fred H. Edgar, Detroit; Forrest F. Tiffany, Cincinnati. District sales managers are A. F. Meyers, Philadelphia, and W. P. Liljestrom, Dallas. James H. Wright and R. B. Polonus, industrial sales representatives, will head the Houston and Memphis offices, respectively.

▶ *UNION MALLEABLE MFG. CO.* — Swenson-Maurer and Assoc., sales representative for "U-Brand" pipe fittings in greater New York area, New Jersey, lower Connecticut.

▶ *AUTOMATIC SWITCH CO.* — Morristown Electrical Supply Co., Morristown, N. J., and Air & Hydraulic Equip. Co., Hackensack, N. J., distributors of "Asco" solenoid valves.

▶ *FOSTER WHEELER CORP.* — S. P. Trewin, supervisor of new Seattle office to serve Idaho, Montana, Oregon, Washington.

▶ *ALLMETAL SCREW PRODUCTS CO., INC.* — Thomas W. Schaid, manager of new midwest division to serve Illinois, Indiana, Iowa, Minnesota, Missouri, Nebraska, Wisconsin, the Dakotas.

▶ *ORANGEBURG MFG. CO., INC.* — Carl F. Arnold, Joseph E. Milardo, Richard Ohlson, district sales managers of central middle Atlantic, north central, Pacific northwest districts, respectively.

▶ *COCHRANE CORP.*—Joseph R. Denton, vice president, New York district sales. +

FASTEN METALS FASTER

WIDE RANGE OF TONGS SUIT MILLER PORTABLES FOR EVERY SHEET METAL APPLICATION

Miller portables require no pampering, stand up to the job for years on end. Light weight, plus "probe" design, produces high volume of low-fatigue work. Natural position handle threads into either side of welder, lever locks tongs firmly to work. Model MSW in either 110v or 220v, weighs 23 lbs., welds 1/8" mild or stainless steel, or two 20 ga. galvanized sheets; model LMSW, 220v, weighs 31 lbs., welds to 3/16" of mild or stainless, or two 16 ga. galvanized pieces. Timers available for both models.

miller ELECTRIC MANUFACTURING COMPANY, INC.
Appleton, Wisconsin
Distributed in Canada by Canadian Liquid Air Co. Ltd., Montreal, P. Q.

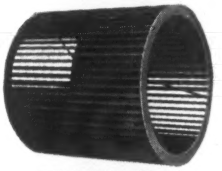
Make

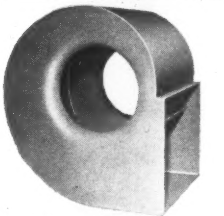
BARRY

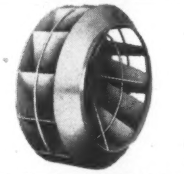
BLOWER COMPANY

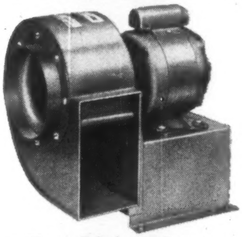
your dependable low cost source of supply for

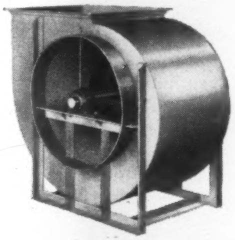
POWER FAN EQUIPMENT


BFC, DI-DW Wheel


BFC, DI-DW Housing


BBI Blower Wheel SI-SW. Class 2.


Direct Drive, All-Purpose Utility Blower


BBI Blower, SI-SW Arrangement No. 3, class 4

We offer users of power fan equipment a full line of blowers, multiple blower assemblies, direct and belt driven ventilating sets, cast iron blowers and various types of centrifugal blower wheels and housings. All sizes from 6" to 73".

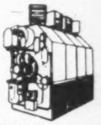
ALL BARRY blower wheels and housings are precision made from steel, aluminum, brass, copper or stainless, and are expertly balanced and trued before shipment.

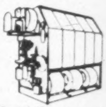
We make power fan equipment *exclusively*, and do not compete with our own customers . . . . . and, we have a high reputation for dependable quality and remarkably fast deliveries. Let us quote on our standard equipment, or upon your special sizes and specifications. Write us today.

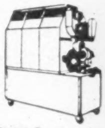
REPRESENTATIVES: A few territories available for sales representatives

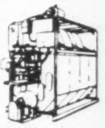
BARRY BLOWER CO.
3100 California Street N.E. • Minneapolis 18, Minnesota

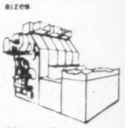
SEND TODAY FOR LATEST HEATER DATA

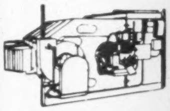

Model H — vertical unit with discharge heads. 12 sizes

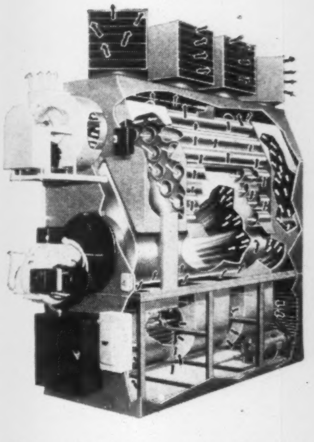

Model D — vertical unit for duct work 12 sizes


Model P — portable, vertical unit for flexible duty. 6 sizes


Model R — inverted unit with discharge heads at bottom. 12 sizes


Model S — vertical unit with side blowers to permit proper location of air mixing dampers. 12 sizes.


Model C — horizontal ceiling suspension unit for space saving 12 sizes.



Tempering Make-up Air? Drying? Space Heating?

Let National Heater Company show you how space heating and ventilating problems can be solved **efficiently** and **economically.** No matter how large or small a plant may be, National Champion Heaters **save** money on installation, operation and maintenance.

NATIONAL *Champion*
DIRECT FIRED HEATERS

6 Models 66 Sizes
400,000 to 3,000,000 BTU's

Automatic Operation
PLUS Year-Round VENTILATING!

Direct-fired for gas, oil and combination fuels. Approved by American Gas Association. Listed by UL

WRITE TODAY FOR A NEW 6-PAGE BROCHURE LISTING SPECIFICATIONS AND DIMENSIONAL DATA OF 1957 LINE OF NATIONAL CHAMPION HEATERS

NO OBLIGATION! MAIL THIS COUPON TODAY!

NATIONAL HEATER CO., Inc., 2475 Doswell Ave., St. Paul 8, Minn.

Gentlemen:

We're interested in knowing more about National Heaters as noted below:

☐ Send additional material on the 1957 line.
☐ Have your representative call on us.

FIRM NAME: ________________
ADDRESS: ________________
BY: ________________
POSITION: ________________

NATIONAL
HEATER CO., INC.
2475 Doswell Ave., St. Paul 8, Minn.

WE HEAR THAT . . .

▶ Purchase of the *KALAMAZOO STOVE CO.* plant by the *CLARAGE FAN CO.*, Kalamazoo, Mich., has just been announced.

The huge industrial property, where 1500 employes built Kalamazoo stoves and furnaces until 1952 when the concern was dissolved, includes approximately 320,000 sq ft of usable manufacturing and warehousing space as compared to 200,000 in the present Clarage facilities. In addition, 13 acres of unoccupied land for future use is included.

HARRY R. CLARAGE, president, indicates that with the completion of legal details by November, the company will begin the movement of all its operations to the new plant. He estimated it will take 10 to 12 months to make necessary plant alterations and complete the transfer. Since the Kalamazoo Stove office building is not included in the purchase, work is expected to start on a new office building in the spring of 1958.

Because of increased business in recent years, Clarage has been forced to rent additional properties at scattered locations. The new property will permit concentration of Clarage activities at one point with a minimum of changes required in the facilities at the new location. Main offices of the Clarage Fan Co. are located on Porter St. in the city.

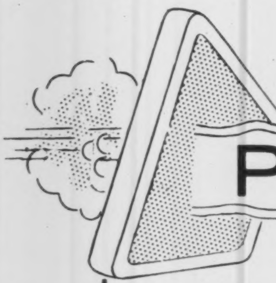
▶ *UNITED STATES GAUGE DIV., AMERICAN MACHINE AND METALS, INC.*, plans to build a new $2.5 million plant near its present site. The structure will provide approximately 180,000 sq ft of additional space and will almost double the present productive capacity.

▶ A new corporation, *THERMO DYNAMICS, INC.*, has been formed to serve customers in the installation of industrial and commercial air conditioning, oil and gas burners, and control systems.

▶ Stockholders of *SERVEL, INC.*, have been advised that the company's All-Year Air Conditioning Div. was sold to the Arkansas Louisiana Gas Co., of Shreveport, subject to the stockholders' approval. The sale price was approximately $4 million.

▶ *BROOKS ROTAMETER CO.* has moved to a new 27,000 sq ft plant in Hatfield, Pa. Facilities have increased 50 percent.

▶ *SPRAY ENGINEERING CO.* has moved into a newly built plant at Burlington, Mass. The new structure combines nearly 30,000 sq ft of manufacturing space with an office area of 6000 sq ft, as well as expanded, fully equipped research quarters.

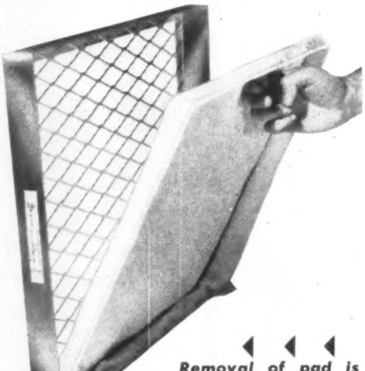


A new concept in air filters

PURE-AIR FILTER

offers GREATER EFFICIENCY-LOWER COSTS

The PURE-AIR FILTER CONSISTS of a highly efficient filter pad of UN-OILED synthetic fibers supported by a cadmium plated permanent metal frame.
There is nothing to wash, dry or re-oil, simply dispose of filter pads when dirty. Cost of replacement pads is far less than conventional throw-away filters.
PURE-AIR filter pads are made of non-woven synthetic fibers bonded into a fluffy blanket-like pad with millions of microscopic air passages — that's why they stop DIRT not AIR.
PURE-AIR filter pads are available in a wide range of efficiencies and densities to meet all requirements. For special application, write for additional information.
PURE-AIR filter replacement pads weigh about one (1) ounce each, reducing labor costs and storaging facilities.
Write for bulletin.



◀ ◀ ◀

Removal of pad is simple . . . the retainer ring is pulled out, snapped back when the new PURE-AIR pad is in place.

ARCO MANUFACTURING CORP.
542 West 55th St. New York 19, N.Y.

you can depend on
AGITAIR for better air

Custom Made

AIR DIFFUSERS with DIFFUSING VANES

Each AGITAIR square and rectangular air diffuser is custom designed to meet your requirements of air flow and interior treatment.

These AGITAIR diffusers have built-in diffusing vanes, scientifically arranged in unlimited louver patterns to provide certified 100% draftless air distribution from any ceiling or wall location.

AGITAIR Catalog R-107 shows you how to select the proper size and pattern for your job conditions.

Write for your copy today.

AIR DEVICES INC.
185 MADISON AVE., N. Y. 16, N. Y.
air diffusers • filters • exhausters

FLAME RETENTION

COMBUSTION EQUIPMENT
ENGINEERED
By . . . . THE
WEBSTER
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COMBUSTION with SAFETY

Unparalled safety is but one of the features of WEBSTER'S revolutionary non-premixing ring gas burner incorporating flame retention regardless of air velocity.

Factory assembled Forced Draft Series H packaged units are available for Gas, Rotary Oil or Combination. Other variations soon to be available.

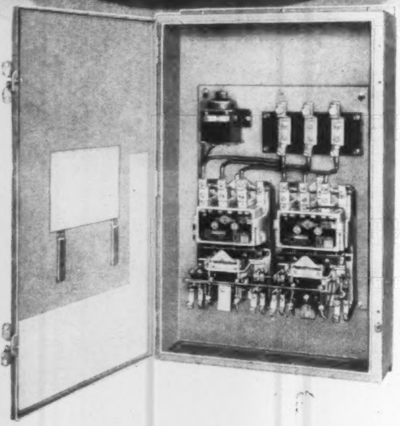
Write for Series B13 literature.

Some Territories Open

The
WEBSTER ENGINEERING *Company*
TULSA 16, OKLAHOMA

Division of SURFACE COMBUSTION CORPORATION, Toledo, Ohio

Specify
FURNAS ELECTRIC
CONTROLS for
AIR CONDITIONING
AND REFRIGERATION



Objectionable voltage drops are eliminated by using Furnas Electric Increment Starters for Part Winding motor applications. These starters have won particular acceptance for the larger horsepower air conditioning and refrigeration units.

Increment starting incorporates the advantages of other types of step starting AT THE LOWEST COST IN THE SMALLEST SPACE. Select the size you need: 10, 20*, 30, 40* and 60 hp, 220 volts. There are no costly auto transformers or resistors.

*Major savings with these "in-between" sizes.

FURNAS 25th YEAR

For information on our complete line of air conditioning and refrigeration controls, write for Bulletin 5519. Furnas Electric Company, 1041 McKee Street, Batavia, Ill.

A22

FURNAS ELECTRIC COMPANY
BATAVIA, ILLINOIS

SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES

WE HEAR THAT

Continued

▶ A plant and new offices have been constructed by *AIR FILTER CORP.* in the Mill-Road industrial center in Milwaukee. The present plant capacity will be doubled as a result of the expansion program.

▶ *MINNEAPOLIS-HONEYWELL REGULATOR CO.* has leased a new $300,000 plant in Fall River, Mass., for production of a new line of electronic industrial controls.

▶ *LeVALLEY McLEOD, INC.* has acquired the office and warehouse building, inventory, and equipment of the Binghamton branch of *W. A. CASE AND SON MFG. CO., INC.* The corporation has moved to the former Case building, where complete stocks of heating equipment, pipe, fittings, valves, industrial and mill supplies are maintained.

▶ *BJORKSTEN RESEARCH LABORATORIES FOR INDUSTRY, INC.*, has opened a new laboratory in Houston. Personnel will conduct sponsored industrial research for many companies located in the chemical and industrial areas of the Southwest. The building contains 6500 sq ft of floor space.

▶ The *FAIRBANKS, MORSE & CO.* steam and power pump product lines have been transferred from the Kansas City plant of *NOVO PUMP AND ENGINE CO.* to the firm's Lansing, Mich., plant. As a result, the Lansing plant has expanded to more than 55,000 sq ft.

▶ *MIDCONTINENT TUBE SERVICE, INC.*, will occupy newly acquired property in Evanston, Ill. New office and storage yard facilities are now under construction.

▶ *BALDWIN-HILL CO.* has formed a new acoustical division for the marketing of a complete line of noise control products. Although the company has been manufacturing acoustical products for many years, this is the first time they have been marketed under the Baldwin-Hill name.

▶ Development of a standard for the installation of hydrogen storage systems is being undertaken by the *COMPRESSED GAS ASSOCIATION.*

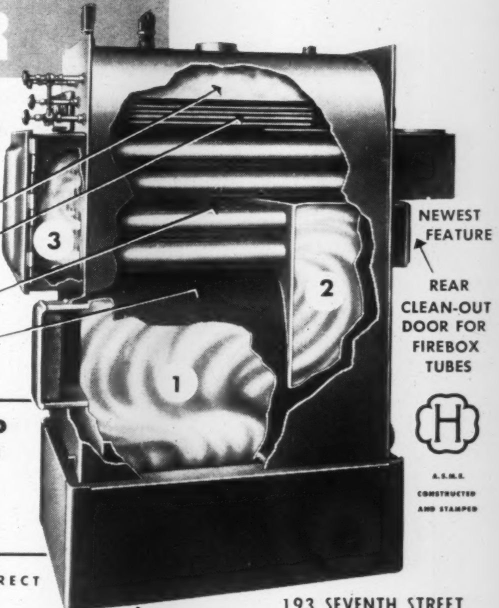
▶ *OLIN MATHIESON CHEMICAL CORP.* will erect a small plant for the assembly of nuclear reactor cores near Montville, Conn. Plans call for the plant to be completed in the spring of next year, and for the eventual construction of a larger plant in addition to the initial facility at the site.

THE Portmar "TP" SERIES THREE-PASS BOILER

Solves Today's Large Structure Requirements

IN APARTMENT HOUSES · COMMERCIAL AND PUBLIC BUILDINGS · INDUSTRIAL PLANTS · INSTITUTIONS · SCHOOLS · HOSPITALS · HOUSING PROJECTS · ETC.

The "TP" Series is a quality engineered Portmar Boiler with the newest features — as up-to-date as today!


LARGE STEAM DOME
INSTANTANEOUS OR TANK TYPE COILS
LARGE WATER VOLUME
HIGH AND WIDE FIREBOX
NEWEST FEATURE
REAR CLEAN-OUT DOOR FOR FIREBOX TUBES
1
2
3
A.S.M.E. CONSTRUCTED AND STAMPED

① ② ③ Flue gas passes through full firebox area in a long sweep. First along the firebox crownsheet to the rear of the boiler. Then through the lower row of tubes to the front of the boiler and back again through the upper row of tubes, passing through the rear smokebox. Dissipated gases disappear up the chimney.

This three-pass system extracts full usable heat, resulting in complete absorbtion of BTU's by the surrounding boiler water—maximum efficiency and economy is assured!

16 SIZES / OIL or GAS FIRED

for steam and hot water systems

CAPACITIES:

STEAM 3,650 to 42,500 sq. ft.
WATER 5,840 to 68,000 sq. ft.

SEE YOUR JOBBER, LOCAL PORTMAR REPRESENTATIVE, OR WRITE DIRECT

Portmar Boiler Company Inc.

193 SEVENTH STREET
BROOKLYN 15, N. Y.
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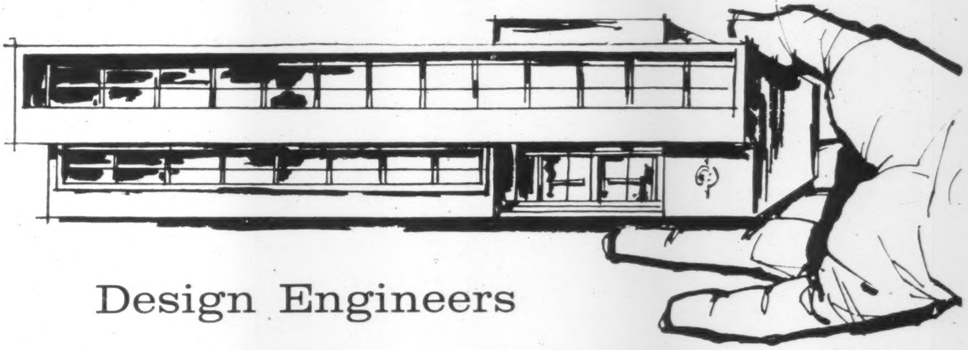
RESIDENTIAL, COMMERCIAL, INDUSTRIAL WATER HEATERS AND HEATING BOILERS • VERTICAL, HORIZONTAL TUBULAR BOILERS • ROTARY FLAME BOILERS



Design Engineers

Argonne National Laboratory is interested in interviewing engineers who have a minimum of 5 to 15 years professional level design experience in these fields:

- PLANT LAYOUT AND BUILDING DESIGN
- HEATING AND PIPING
- VENTILATION AND AIR CONDITIONING
- ELECTRICAL LIGHTING AND POWER
- STRUCTURAL ENGINEERING

Responsibilities will involve co-ordinating the requirements, design and construction of new buildings and facilities. Prerequisite: ability to provide liaison between the research staff, architect-engineer, and construction contractor.

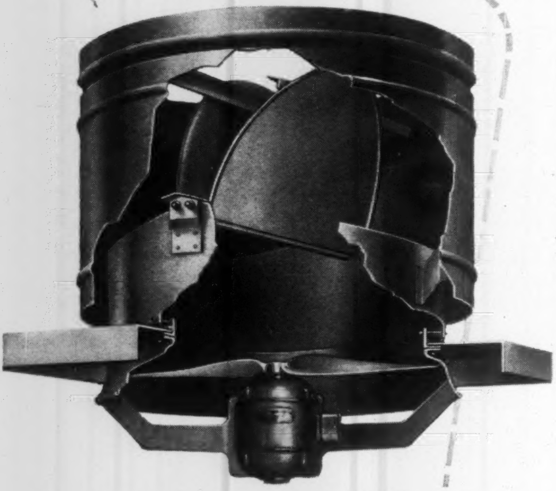
Inquiries are Invited:

Send resumé to
Professional Personnel Office
P.O. Box 299
Lemont, Illinois

Argonne P. O. BOX 299 • LEMONT, ILLINOIS
NATIONAL LABORATORY
SUBURBAN CHICAGO AREA

SKY-BLAST®

moves more air at less cost



...powerful roof ventilator with

NEW Smoke-Trip® Damper Opener

Because Propellair Sky Blast roof ventilators do not need the usual restricting weather cover which deflects and reduces air movement, they move more air at less cost. Fumes and heat are thrown high into the air, can't re-enter windows or turn downward to create roof maintenance problems. Their efficiency is not effected by wind velocity or direction. Weatherproof dampers open automatically when fan is started. Hot-dip galvanized after fabrication, Propellair Sky Blast ventilators are ruggedly built to give years of maintenance-free service. Available in sizes from 16" to 60" for 2820 to 78,800 CFM—PFMA Certified Ratings.

If desired, exclusive new Smoke-Trip heat-actuated venting device which automatically opens dampers in case of fire to exhaust smoke and fumes is available.

WRITE FOR BULLETIN NO. 680-HP

R&M PROPELLAIR®

DIV. OF ROBBINS AND MYERS, INC.
SPRINGFIELD, OHIO

Certified Ratings
PFMA

MAN COOLER
VANEAXIAL
TUBEAXIAL
EXTENDED SHAFT

MOVING AIR IS OUR BUSINESS

WE HEAR THAT

Continued

▶ A plastic products department has been created at *DRESSER MFG. DIV., DRESSER INDUSTRIES, INC.* Products for the joining, repairing, and maintenance of pipe will be developed and marketed.

▶ Operations will begin soon at *YOUNGSTOWN SHEET AND TUBE CO.'s* new seamless tube mill which will employ more than 300 persons. The new structure is the latest addition in a continuing expansion program at the company's Indiana Harbor Works.

▶ All manufacturing components of *IRON FIREMAN MFG. CO.'s* heating division will be consolidated in Cleveland this fall with the acquisition of a third plant in the city. Operations at the SelecTemp Div. in Ligonier, Ind., will be transferred to the new plant.

▶ A new group, the *MODULAR BUILDING STANDARDS ASSOCIATION*, has been formed by the American Institute of Architects, the Associated General Contractors of America, the National Association of Home Builders, and the Producers' Council, Inc. A program designed to hold down building costs through adoption of a basic unit of measurement — the 4 in. module—is being boosted by the new group.

▶ *JOHNSON-WILLIAMS, INC.*, has completed negotiations with *HEILAND DIV., MINNEAPOLIS HONEYWELL REGULATOR CO.*, to take charge of sales and servicing of the Heiland gas indicator.

▶ The Newark, N.J., sales and service staff of *BRISTOL CO.* recently moved into new, enlarged offices at 744 Broad St. in that city.

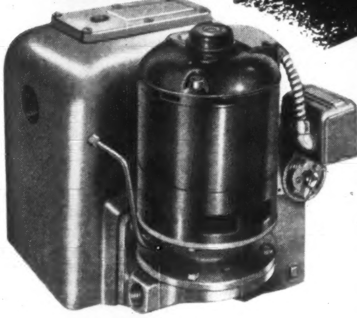
▶ *RECOLD CORP.'s* southwest district office has moved into new quarters in Houston. The company is celebrating its 25th anniversary this year.

▶ *SARCO CO., INC.*, and *SARCOTHERM CONTROLS, INC.*, will move their national headquarters from the Empire State Bldg. to expanded office facilities at 635 Madison Ave., New York City.

▶ The *FRICK CO.* branch office in St. Louis has moved to 1221 Locust St.

▶ *LELAND S. ROSENER, JR., ENGINEERS AND ARCHITECTS*, San Francisco, has changed its name to *ROSENER ENGINEERING, INC., ENGINEERS AND ARCHITECTS.*

IT'S NEW! IT'S TOPS!
it's the Sterlco® 4223-E
LOW PRESSURE
CONDENSATE PUMP



- SURPRISING VERSATILITY
- UNUSUAL CAPACITY
- TREMENDOUS PERFORMANCE
- ECONOMICAL PRICE

- **DESIGNED SPECIFICALLY FOR SMALL INSTALLATIONS . . .** yet adequate for jobs up to 3000 sq. ft. EDR.
- **ALLOWS ACCURATE ADJUSTMENT . . .** Float switch travel can be adjusted for a draw of from .7 to 3 gals. per pumping cycle for close adjustment to boiler requirements.
- **SMALLER IN SIZE, YET BIGGER IN USABLE VOLUME . . .** a truly believe-it-or-not design. Although the 5 gal. cast iron tank is one of the smallest, it has greater "draw" or usable volume than many pumps with larger tanks.
- **LOTS OF EXTRA CAPACITY FOR EMERGENCIES . . .** Equipped with the same pump and motor used for the larger capacity ¼ h.p. Sterlco pumps.
- **TAKES LESS SPACE THAN ANY OTHER . . .** Occupies only 1.6 sq. ft. of floor space. Fits easily into almost any small corner because of rectangular shape and convenient location of motor and switch at front of unit.
- **EXCEPTIONALLY QUIET, RUGGED, DEPENDABLE . . .** Includes the same high quality features found in Sterlco's heavy duty pumps.

USE THE RIGHT PUMP FOR THE JOB!

The addition of the No. 4223-E makes the Sterlco 4100-4200 Series Condensation Pumps one of the most complete lines of low pressure pumps on the market.

Write now for complete information.

Sterlco Products Distributed Through Leading Heating and Plumbing Wholesalers. Representatives in all principal cities.

STERLING, INC.

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CONDENSATION AND VACUUM PUMPS

HEATING SPECIALTIES

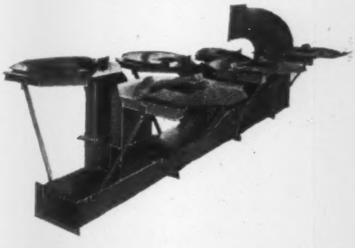
TEMPERATURE CONTROLS

Corrosion Conquered by Van-Cor DUCTS

OLD METHOD—To exhaust fumes from their plating department, a bearing manufacturer used metal coated ducts. Corrosion destroyed them in eight months.

NEW METHOD—Van-Cor Ducts shown above have already served three years—*four times longer*—and are as good as new!

An unplasticized polyvinyl chloride, Van-Cor has licked scores of corrosion problems. Van-Cor is fabricated into ducts, hoods, chemical tanks, stacks, etc. Also available in pipe, fittings and valves. Both Chemically Resistant and Impact Resistant types. Van-Cor has only half the weight of aluminum, yet has high tensile strength.



Intricate Van-Cor hood and duct for exhausting acid fumes while reclaiming precious metals. Previous duct materials were replaced every two months. This Van-Cor fabrication is over two years old.

INVESTIGATE!

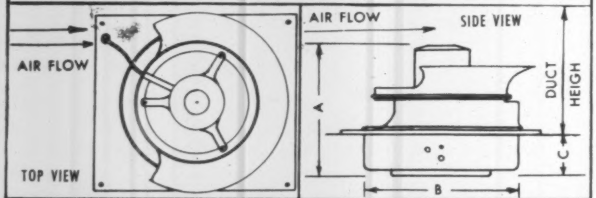
Write for Bulletin, Specifications and Name of Nearest Distributor.

INDUSTRIAL DIVISION OF
COLONIAL PLASTICS MFG. CO.

SUBSIDIARY OF THE VAN DORN IRON WORKS CO.
2685 EAST 79th STREET • CLEVELAND 4, OHIO

NEW, CENTRIFUGAL, IN-DUCT HUMIDIFIER
MORE COMPACT— INSTANT ACTION
HONEST HUMIDIFICATION FOR REAL WINTER AIR CONDITIONING
9

Walton has the only complete line of humidifiers—engineered to any type job. Technical information on how this equipment can be applied to your specific air conditioning problem on request.



Walton

AUTHORITIES ON HUMIDIFICATION SINCE 1930

Send data on the in-duct humidifiers developed by Walton. Want more details on the product, the application, and how I can develop this new business. No obligation.

Name..
Name of Company..........................
Address.......................................
City..............................Zone............State.........
Type of business.........Architect........Engineer........Contractor

Walton Laboratories, Inc., Dept. HP-10 Irvington 11, N. J.

WE HEAR THAT

Continued

▶ *TRANE CO.* has announced a new program designed to assist wholesalers to increase sales in the big building remodeling markets. A complete literature selection has been prepared as part of the program.

▶ An employee service award program has been established by *TRANTER MFG. INC.* The awards are earned by individual employees and presented in recognition of contributions made by them to the growth of the organization.

▶ *POWERS REGULATOR CO.* conducted three one-day clinics in Milwaukee, Racine and Green Bay, Wis. The care, maintenance, and a basic understanding of all temperature control systems were discussed at the sessions.

▶ *BURNHAM CORP.* has announced a change of name for the company's boiler division. It is now known as the heating and cooling division.

▶ *TRANE CO.* recently received a Dept. of Defense reserve award certificate for outstanding cooperation with the armed forces reserve. +

Manufacturers' Agents

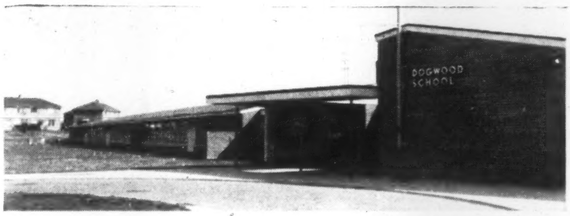
Are you interested in securing additional lines?

We are occasionally asked by our manufacturer advertisers to suggest the names of manufacturers' agents in various sections of the country whom they can contact in regard to representation of their industrial large building heating, piping and air conditioning products.

If you would like your name listed on our records for inquiries we may receive for your territory, we invite you to write us. There is no charge in connection with this service.

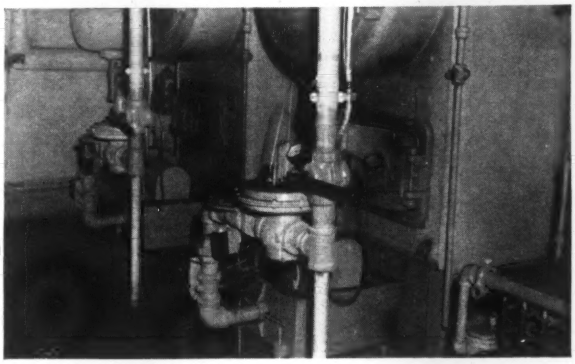
HEATING, PIPING & AIR CONDITIONING

6 N. Michigan Ave Chicago 2, Ill.



LO-BLAST

POWER GAS BURNER CONTRIBUTES TO ECONOMICAL SCHOOL MAINTENANCE



Dogwood School at Park Forest, Illinois equipped with Lo-BLAST Burner

In the huge home development project at Park Forest, Illinois, the thousands of homes in the community are heated by propane gas, supplied from two 30,000 gallon tanks.

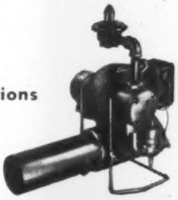
Most churches, schools and stores are equipped with Lo-BLAST Power Gas Burners. The selection of these burners was dictated by their outstanding record for safe, consistent performance plus low-cost installation and operation.

Lo-BLAST costs 10% less to operate

The Lo-BLAST burner uses an extremely quiet, low speed blower to provide perfectly controlled primary and secondary air from start to finish of each run. Operation is always independent of natural draft conditions—ideal for down-draft boilers. Combustion is completed in an incandescent firebox, with radiant heat applied to the crown sheet as well as side walls.

Lo-BLAST costs less to install

Power burners eliminate the need for high chimneys. Inshot design reduces maintenance costs. Complete factory assembly reduces installation costs. Each unit is factory tested on gas before shipment.

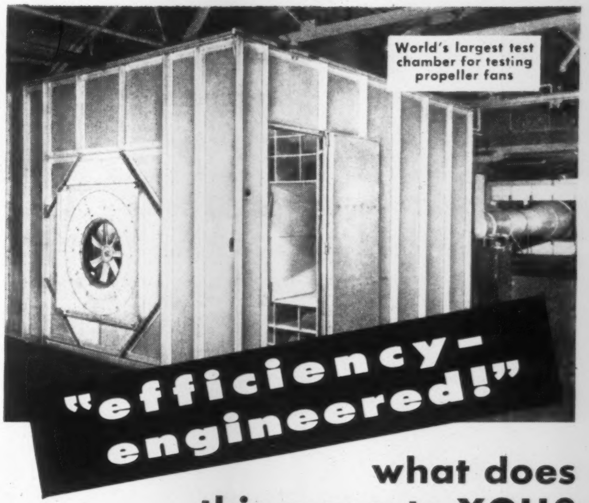


Lo-BLAST ECONOMITE for residential and apartment installations

●

Lo-BLAST Power Gas Burners are available in capacities from 70,000 to 20,000,000 BTU input. Write for literature.

MID-CONTINENT
METAL PRODUCTS CO.
1960 N. Clybourn Ave., Chicago 14, Ill.



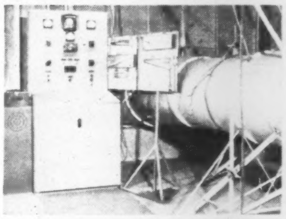
what does this mean to YOU?

IT MEANS AEROVENT FANS ARE INDIVIDUALLY "JOB-TESTED" FOR PERFORMANCE AND RATING!

One of the most complete facilities in the United States for scientific air-moving research is maintained by Aerovent.

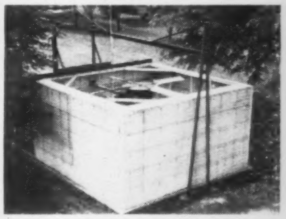
In addition to ceaseless experimental work, this up-to-the-minute engineering laboratory, with the aid of the world's largest test chamber (wind tunnel), tests Aerovent units under simulated operating conditions. Typical resistances which may be encountered in actual operation are applied to each unit, to assure satisfactory performance and economy in every industrial application.

Write for free Engineering Bulletin E-57



CONTROL BOARD

for observing and recording operating characteristics of fans being tested in chamber shown at top.



OUTDOOR LABORATORY

for confirming of wind tunnel tests and performance data, and conducting endurance test programs.

Aerovent builds fans for every type of industrial application, in sizes from 9" to 96", and capacities to 145,000 CFM. Large propellers for cooling towers and heat exchangers in diameters to 18 feet.

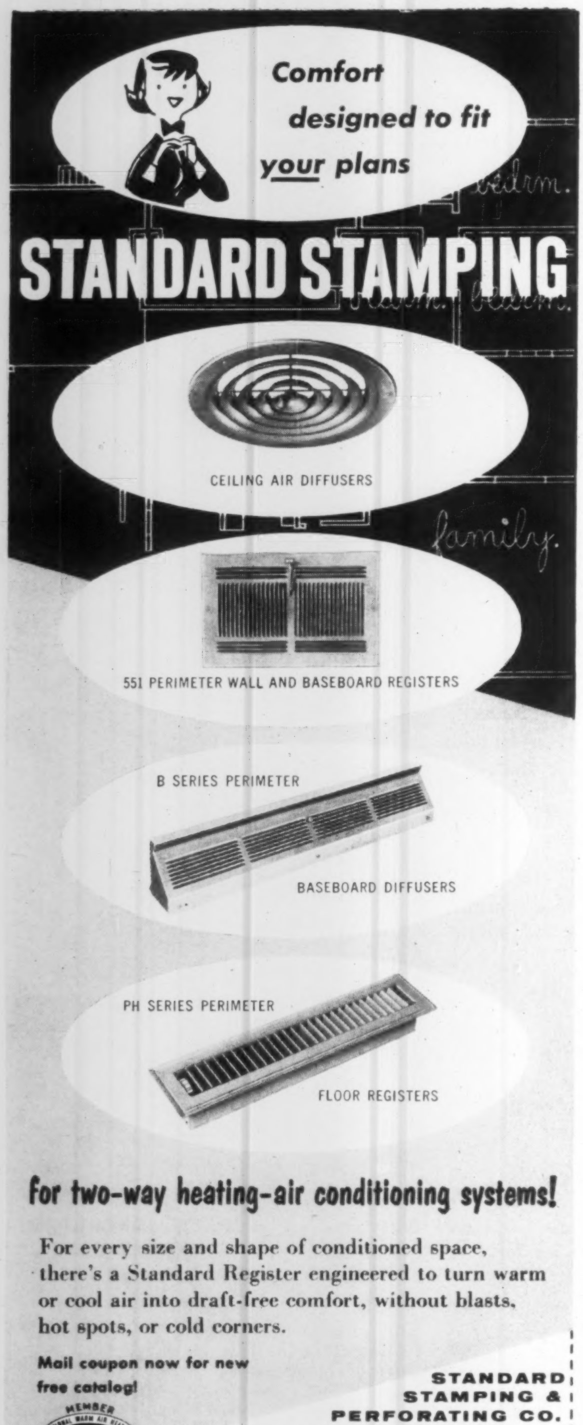
WORLD'S LARGEST exclusive manufacturers of industrial air-moving equipment!

Aerovent FANS

Rated in accordance with Standard Test Code and U.S.D.C. Comm. Std. CS178-51.

Certified Ratings PFMB

Aerovent FAN CO. INC.
Ash and Branch Sts
Piqua, Ohio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for two-way heating-air conditioning systems!

For every size and shape of conditioned space, there's a Standard Register engineered to turn warm or cool air into draft-free comfort, without blasts, hot spots, or cold corners.

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Please send your new Registers & Grilles catalog.

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PUT A WARM AIR REGISTER UNDER EVERY WINDOW

MEETINGS & CONVENTIONS

1957

OCT. 7-9—*American Gas Association,* annual convention. Kiel Auditorium, St. Louis. AGA headquarters: 420 Lexington Ave., New York 17.

OCT. 7-9—*National Electronics Conference.* Hotel Sherman, Chicago. Information: National Electronics Conference, 84 E. Randolph St., Chicago 1.

OCT. 10-11—*Eighth Annual National Noise Abatement Symposium.* Hotel Sherman, Chicago. Information: J. J. Kowal, conference secretary, Armour Research Foundation, 10 W. 35th St., Chicago 16.

OCT. 21—*Second Annual Air Pollution Symposium.* Franklin Institute, Philadelphia. Subject: "Particulate Emission." Information: Franklin Institute, Benjamin Franklin Pkwy. at 20th, Philadelphia 3.

OCT. 21-25—45*th National Safety Congress & Exposition.* Conrad Hilton Hotel, Chicago. National Safety Council, 425 N. Michigan Ave., Chicago 11.

OCT. 22-24—*National Association of Corrosion Engineers,* seventh annual western regional conference. San Diego. Information: NACE, 1061 M & M Bldg., Houston 2.

OCT. 28-31—1957 *Trade Fair of the Atomic Industry.* Coliseum, New York. Information: Atomic Industrial Forum, Inc., 3 E. 54th St., New York 22.

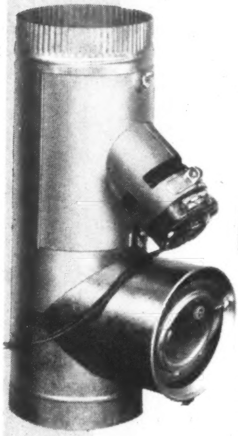
OCT. 30-31—*Industrial Hygiene Foundation,* 22nd annual meeting. Mellon Institute, Pittsburgh. Information: Mellon Institute, 4400 Fifth Ave., Pittsburgh 13.

OCT. 31-*NOV.* 2—*Western Society of Engineers,* national conference. Edgewater Beach Hotel, Chicago. Sponsored by Engineers Joint Council, Scientific Manpower Commission, National Science Foundation and National Academy of Sciences—National Research Council. Information: Engineers Joint Council, 29 W. 39th St., New York 18.

NOV. 12-14—*National Association of Corrosion Engineers,* northeast regional meeting. Pittsburgh. NACE headquarters: 1061 M & M Bldg., Houston 2.

TWO GOOD REASONS It Pays to Always Buy

WALKER FUEL-SAVER
AUTOMATIC DRAFT REGULATOR



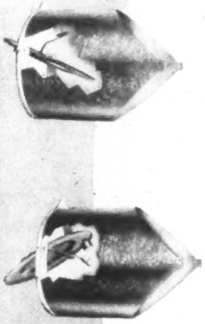
WALKER

SHUR-FLO DRAFT INDUCER

Recommended for oil- and coal-fired jobs that don't draw well, and gas jobs that don't vent positively. Eliminates need for unsightly chimney extension and for separate installations by combining fan operated inducer with draft regulator control. Installs easily at any angle. You'll save time and money with the Walker Shur-Flo.

WALKER

BBG DOUBLE SWING CONTROL



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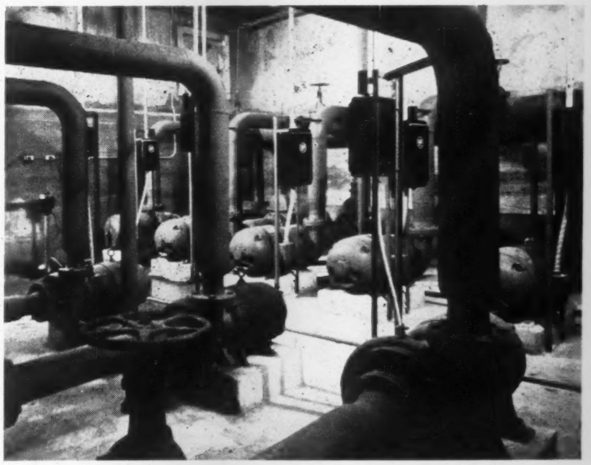

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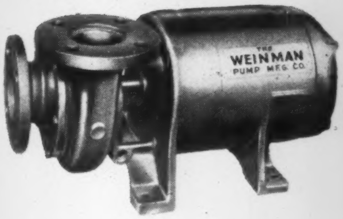

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MEETINGS & CONVENTIONS *Continued*

1957

NOV. 13-16—*National Association of Corrosion Engineers,* technical meeting and corrosion control short course. Key Biscayne Hotel. Key Biscayne, Fla. Conducted by Miami section of NACE. NACE headquarters: 1061 M & M Bldg., Houston 2.

NOV. 13-14—*Air Pollution Conference.* Chicago. Cosponsored by Armour Research Foundation and Midwestern Air Pollution Prevention Association. Information: Conference secretary, Armour Research Foundation, 10 W. 35th St., Chicago 16.

NOV. 14-16—*American Society of Refrigerating Engineers,* semi-annual meeting. Chicago. ASRE headquarters: 234 Fifth Ave., New York.

NOV. 16-18—*Refrigeration and Air Conditioning Contractors National Association,* annual convention. Drake Hotel, Chicago. The association is at 10660 Carnegie Ave., Cleveland 6.

NOV. 16-18—*Air-Conditioning and Refrigeration Wholesalers,* annual meeting. Sheraton Hotel, Chicago. Information: 2607 N. High St., Columbus, Ohio.

NOV. 18-21—10*th Exposition of the Air-Conditioning and Refrigeration Industry.* International Amphitheater, Chicago. Air-Conditioning and Refrigeration Institute, 1346 Connecticut Ave., N. W., Washington 6, D. C.

NOV. 19-22—*National Warm Air Heating and Air Conditioning Association,* committee meetings and annual convention. Morrison Hotel, Chicago. NWAH-ACA headquarters: 640 Engineers Bldg., Cleveland 14.

DEC. 4-5—*Building Research Institute,* research conference. Shoreham Hotel, Washington, D. C. Information: Harold Horowitz, technical secretary, Building Research Institute, 2101 Constitution Ave., Washington 25, D. C.

DEC. 4-5—*Third Annual National Construction Industry Conference.* Congress Hotel, Chicago. Information: J. J. Kowal, conference secretary, Armour Research Foundation, 10 W. 35th St., Chicago 16.

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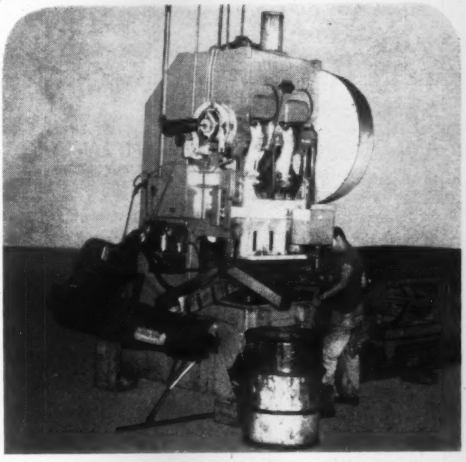

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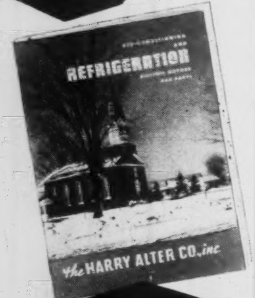

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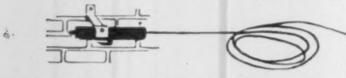

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MEETINGS & CONVENTIONS

Continued

1958

JAN. 27-29—*American Society of Heating and Air-Conditioning Engineers, Inc.*, 64th annual meeting. Pittsburgh. Information: A. V. Hutchinson, executive secretary, ASHAE, 62 Worth St., New York 13.

JAN. 27-30—1958 *Plant Maintenance and Engineering Show.* International Amphitheater, Chicago. Management: Clapp & Poliak, Inc., 341 Madison Ave., New York 17.

FEB. 3-4—*Instrument Society of America*, national conference on progress and trends in chemical and petroleum instrumentation. Wilmington, Del. ISA headquarters: 313 Sixth Ave., Pittsburgh 22.

FEB. 17-20—*Seventh Annual Industrial Ventilation Conference.* Kellogg Center, Michigan State University, East Lansing, Mich. Information: Industrial Ventilation Conference, Continuing Education Service, Michigan State University, East Lansing, Mich.

MARCH 17-21—*National Association of Corrosion Engineers*, annual conference and exposition. Civic Auditorium, San Francisco. NACE headquarters: 1061 M & M Bldg., Houston 2.

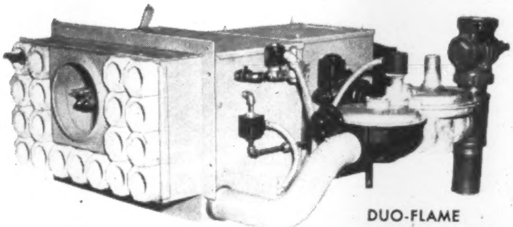
MARCH 31-*APRIL* 2—*Gas Appliance Manufacturer's Association*, annual meeting. The Greenbrier, White Sulphur Springs, W. Va. GAMA headquarters: 60 E. 42nd St., New York 17.

MAY 4-7—*Air-Conditioning and Refrigeration Institute*, annual meeting. The Homestead, Hot Springs, Va. ARI headquarters: 1346 Connecticut Ave., N. W., Washington 6, D. C.

MAY 7-11—*Western Air Conditioning, Heating, Ventilating and Refrigeration Exhibit and Conference.* Shrine Exposition Hall, Los Angeles. Sponsored by Western Air Conditioning Industries Association. Information: Fred J. Tabery, exhibit manager, 3443 S. Hill St., Los Angeles 7.

MAY 11-14—*Fluid Controls Institute.* Lake Placid Club, Lake Placid, N. Y. Information: Fluid Controls Institute, Inc., P. O. Box 191, Decatur, Ill.

MAY 19-23—*National Fire Protection Association*, annual meeting. Palmer House, Chicago. The association is at 60 Batterymarch St., Boston.



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40° to 100°F	24 Hours
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60° to 90°F	8 Hours
70° to 130°F	24 Hours
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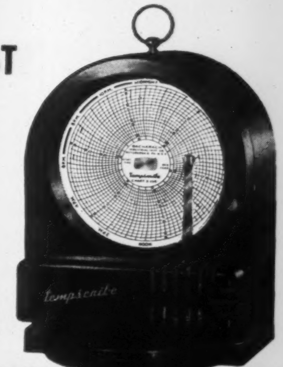

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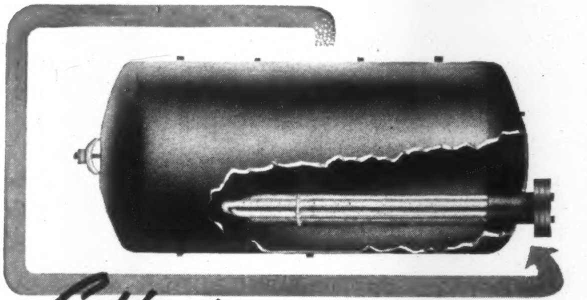

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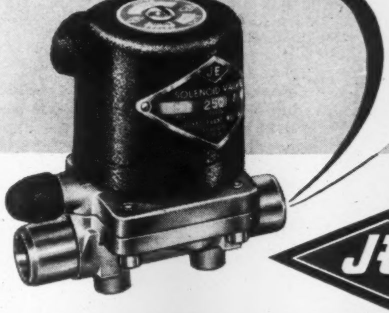

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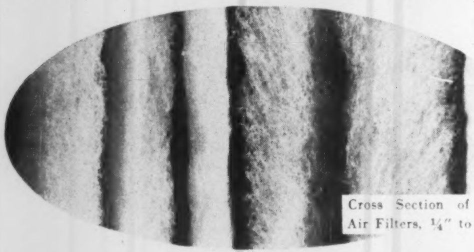

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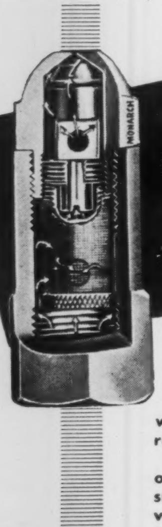

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MEETINGS & CONVENTIONS *Continued*

1958

JUNE 9-13—*Fourth International Automation Exposition and International Automation Congress.* Coliseum, New York. Information: Richard Rimbach Assoc., 845 Ridge Ave., Pittsburgh 12.

JUNE 14-16—*American Society for Testing Materials.* Hotel Statler, Boston, ASTM headquarters: 1916 Race St., Philadelphia 3.

JUNE 23-25—*American Society of Heating and Air-Conditioning Engineers, Inc.* and *American Society of Refrigerating Engineers,* joint meeting. Hotel Leamington, Minneapolis. ASHAE headquarters: 62 Worth St., New York 13. ASRE headquarters: 234 Fifth Ave., New York 1.

OCT. 5-8—*National Association of Corrosion Engineers,* technical session. Hotel Somerset, Boston. NACE headquarters: 1061 M & M Bldg., Houston 2.

OCT. 12-16—*American Gas Association,* annual convention. Atlantic City. AGA headquarters: 420 Lexington Ave., New York 17.

OCT. 20-24—*46th National Safety Congress & Exposition,* Chicago. National Safety Council, 425 N. Michigan Ave., Chicago 11.

OCT. 22-24—*Air-Conditioning and Refrigeration Wholesalers,* annual meeting. Sheraton-Palace Hotel, San Francisco. Information: 2607 N. High St., Columbus, Ohio.

NOV. 17-21—*Society of the Plastics Industry,* eighth national plastics exposition. International Amphitheater, Chicago. SPI is at 250 Park Ave., New York 17. ‡

Obituary

John R. McConnell

JOHN R. McCONNELL, 69, a former vice president and advertising director of American Air Filter Co., died August 8, following a short illness. Mr. McConnell retired last year after 33 years in the air filter business. He began his career with Reed Engineering Co. in 1923, and contributed greatly to the growth of the firm through its various changes and expansions. He held various titles—assistant sales manager, sales manager, manager of air filter sales, and advertising manager. He served as secretary-treasurer of the National Association of Air Filter Manufacturers and its successor, Air Filter Institute, for 20 years. ‡

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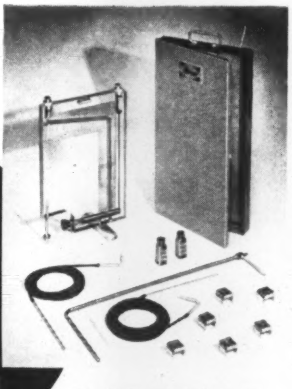

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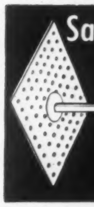

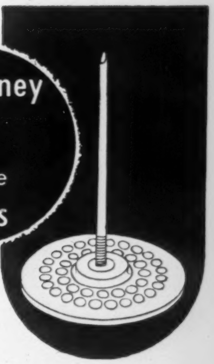

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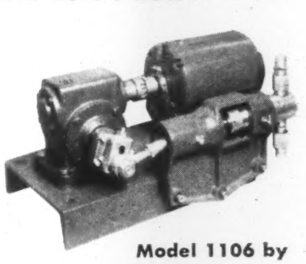

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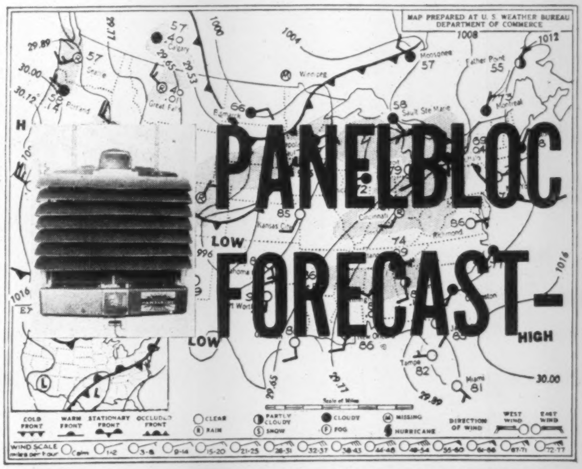

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SUGGESTED SAFE PRACTICES WHEN INSTALLING AND SERVICING GAS APPLIANCES — American Gas Association, 420 Lexington Ave., New York 17. 40c.

CENTRIFUGAL AND AXIAL FLOW PUMPS — Second Ed. By A. J. Stepanoff. 462 pp. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. $12.

INDUSTRIAL WATER AND INDUSTRIAL WASTE WATER — ASTM technical publication No. 207. 52 pp. American Society for Testing Materials, 1916 Race St., Philadelphia 3. $2.00.

POLYETHYLENE — By Theodore O. J. Kresser. 217 pp. Reinhold Publishing Corp., 430 Park Ave., New York. $4.95.

FUNDAMENTALS OF COMBUSTION OF GASEOUS FUELS — IGT research bulletin. 64 pp. Institute of Gas Technology, Technology Center, Chicago 16. $5.00.

THE DESIGN OF A HEAT PUMP BURIED COIL — By Donald M. Vestal, Jr. and Billie J. Fluker. 34 pp. Texas Engineering Experiment Station, College Station, Tex. $2.00.

GUIDE SPECIFICATIONS FOR TYPICAL LOW-PRESSURE HEATING PLANTS — BCI publication. 64 pp. Bituminous Coal Institute, 802 Southern Bldg., Washington 5, D. C. Free.

FASTENERS HANDBOOK — By Julius Soled. 430 pp. Reinhold Publishing Corp., 430 Park Ave., New York. $12.50.

WELDING HANDBOOK — Fourth Ed. 560 pp. American Welding Society, 33 W. 39th St., New York, 18. $9.00.

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Harry Hadley and Associates
Marietta, Ohio

Boulder Parts Corp.
1509 South Chestnut Street
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* Write today for the name of the Koch Representative nearest you.

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321 West Douglas
Wichita, Kansas
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Jetty

DIAMOND
TRADE MARK
GRILLES
Look Better — Last Longer
Superior workmanship and finish in heavy-gauge metal assures installations of lasting beauty. Most designs stamped in any thickness, up to one-fourth inch, from any metal. Catalog No. 36 illustrates all designs and gives complete working data. Free on request.
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Rates for classified advertising are 15 cents for each word including heading and address. One inch $7.00. Count nine words for keyed address. Minimum $2.50 for each insertion. Cash must accompany order. Closing date 10th of month preceding issue.

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Positions available with long established, expanding Engineering and Construction firm. Work on Design of Industrial Plants and Research Laboratories.

Experienced men preferred. Salaries dependent on qualifications and ability.

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Apply in person or in writing with resume.

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Engineers — Constructors
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MECHANICAL ESTIMATOR — Excellent opportunity in growing mechanical firm for estimator capable of making a complete take-off, pricing, and bidding mechanical work consisting of plumbing, heating, ventilating and utilities for industrial and commercial projects, ranging in prices from $100,000. to $3,000,000 class.

Besides ability to perform, above applicant must be neat, accurate, ambitious and sincere. Persons not currently employed at estimating need not apply.

Our company operates out of Santa Fe, New Mexico, bidding work in the Rocky Mountain area. Salary commensurate with ability plus benefit fringes. Must be able to furnish top references. Interested person write: L. E. MEYER COMPANY, Box 2266, Santa Fe, New Mexico.

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Crippling!
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✓ SITUATIONS WANTED

MECHANICAL ENGINEER — B.S. Degree with option in Air Conditioning, and Refrigeration, Registered Professional Mechanical Engineer. Seven years experience in field sales of Heating, Ventilating, Air Conditioning and Refrigeration Equipment. Would like position in sales department or application department handling field problems in home office of well established manufacturer. Preferred location Southeastern United States. Age 31, no disabilities. Address Key 1320A, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Illinois.

Air Conditioning and Refrigeration Engineer: B. S. in M. E. 18 years experience in refrigeration, air conditioning, heating and ventilation. Experience includes facilities for heavy machinery production, chemical and oil industries as Project Engineer and Consultant. Registered Professional Engineer in Michigan, Indiana and Illinois. Age 39. Desires responsible position in industry or consulting fields. Address Key 1322A, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Ill.

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✓ MISCELLANEOUS

For self-instruction in Heating and Air Conditioning. Includes key lectures on heat transfer and thermodynamic properties of air. Includes 26 page analysis of important manuals, guides, standards, etc. Includes plan for self-instruction. Based on academic and consulting experience. Send $6.00. Or for more information write DAVID C. CHOATE, Box 5, Campus Station, Cincinnati 21, Ohio.

✓ AGENTS WANTED

Distributors wanted for new revolutionary electric commercial radiant heater, especially in the North Eastern States. Write giving brief resume, including territory covered, organization and present lines handled. Address Key 1321A, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Ill.

Manufacturer's representative wanted for states of Tennessee, Alabama, Louisiana, Arkansas and Mississippi, to handle full Lima line of heating and air conditioning registers and grilles. Write Paul Kelly, 897 Higgs Avenue, Columbus, Ohio.

✓ SITUATIONS OPEN

SALES ENGINEER — excellent opportunity with expanding specialty manufacturer of cast iron gas boilers for aggressive man with background in the wet-heat field, to call on jobbers, contractors, architects, builders, utilities. Able to organize sales meetings and render technical field service. Willing to travel and relocate. Applications held in strict confidence. Submit resume to Key 1323A, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Ill.

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UNIQUE SITUATION

Well rated, low-cost manufacturer of shell and tube type heat exchangers, assembled refrigeration and air conditioning systems, wishes to purchase or merge with organization whose similar or allied products are now being sold by a well-developed sales distribution setup selling to mechanical and air conditioning contractors. We are principals and wish to deal with principals. Replies kept in strictest confidence. Box 965, Realservice, 110 West 34th St., New York, New York.

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Coming Soon!
The January 1958
Annual Directory Number!

We're giving the
United Way
How about you?

Contractor: Mannen & Roth, Cleveland, Ohio

When you're up in the air about fastening . . . use *Ramset*®!

Fastening ducts to the framework of a new building can be done hours, even days, faster with RAMSET. RAMSET did this job 80% faster, and saved this contractor $24.00 per day, per man!

RAMSET reaches hard-to-get-at places faster, easier. It's powder-actuated. No bulky power lines or heavy equipment to drag around. Power and fasteners are conveniently carried in the operator's pocket. Ideal for ladder and scaffold work, RAMSET's one-hand operation results in less fatigue.

If you need fasteners in a hurry, your RAMSET dealer will deliver them to you "on-the-job". He's listed under "Tools" in the phone book. Also ask about SHURE-SET® hammer-in fastening tool for light-duty fastening (it's a RAMSET companion tool).

Write now for new catalogs.

Ramset Fastening System
WINCHESTER-WESTERN DIVISION
OLIN MATHIESON CHEMICAL CORPORATION
12109-J BEREA ROAD • CLEVELAND 11, OHIO

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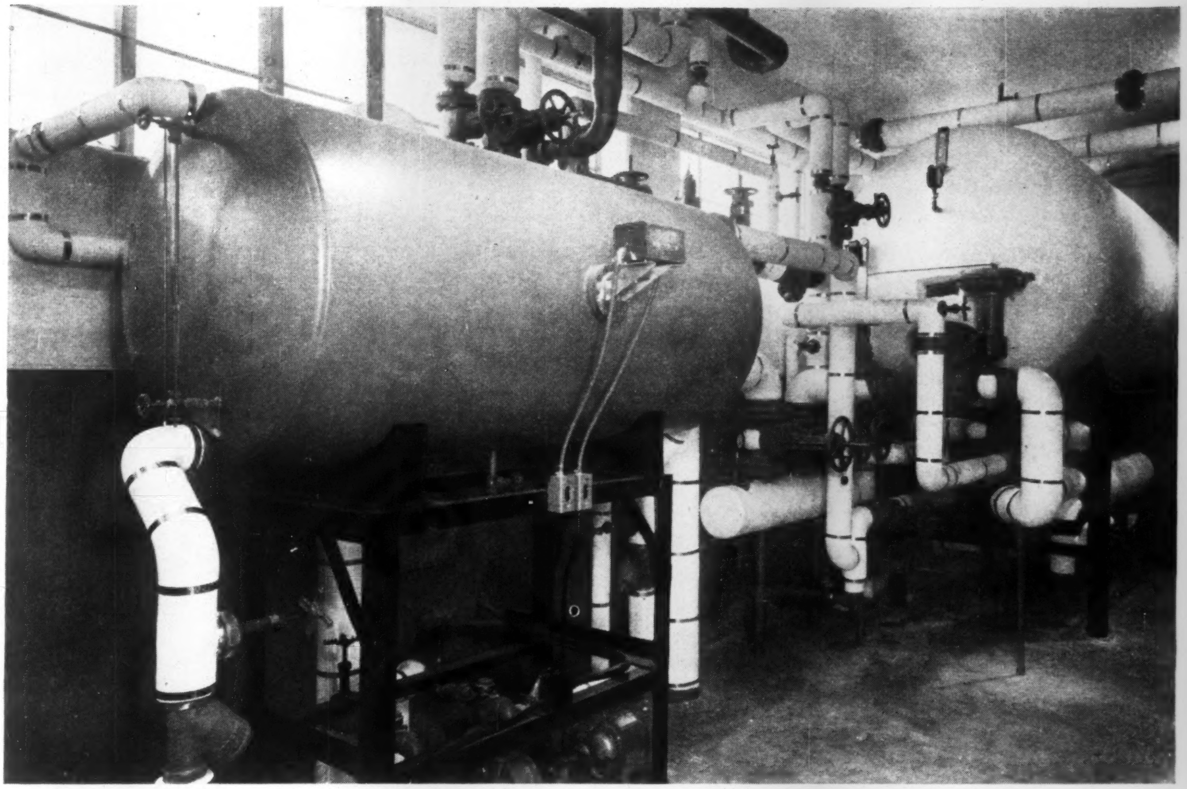


"FEATHERWEIGHT" 85% MAGNESIA ON ANOTHER JOB. Hot-water storage tanks in the humid atmosphere of a laundry are insulated with a 2" thickness of K&M "Featherweight" 85% Magnesia Block Insulation.

In thermal insulation, K&M "Featherweight" 85% Magnesia quality STAYS SOLD

... quality that doesn't cost a cent more

When the customer knows that the insulation purchased will retain its high efficiency for the life of the equipment, he's sold permanently. It's *easier* to sell with such quality to back you.

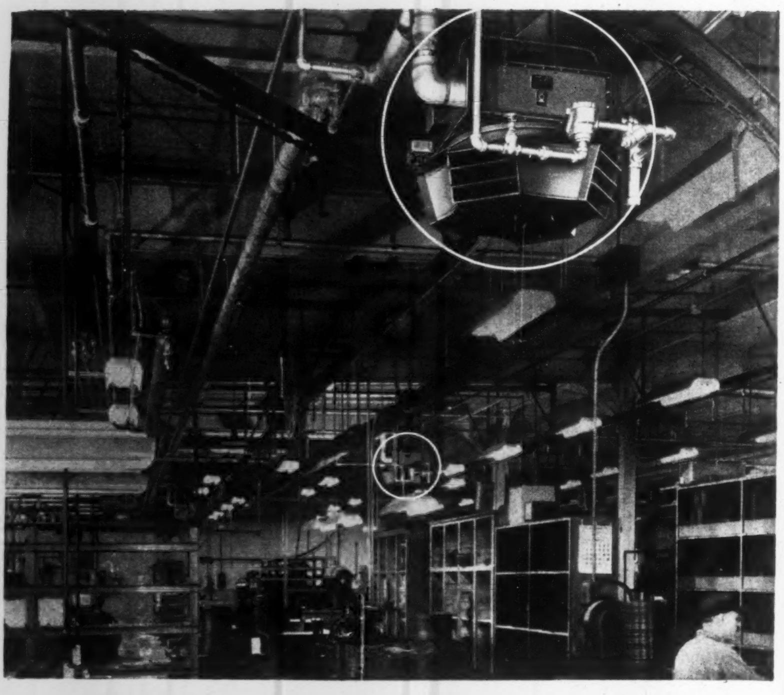
You have this quality in K&M "Featherweight" 85% Magnesia Pipe and Block Insulation. "Featherweight" has long been a recognized leader in its important temperature range—up to 600°F. It handles easily, is made to withstand the abuses of long years of service.

"Featherweight" 85% Magnesia is widely advertised to your customers. It's a vital part of the complete K&M line of high- and low-pressure heat insulations—a line whose *quality stays sold*.

For further information on K&M Insulation, write us a card.

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

K·M
BEST IN ASBESTOS



REVOLVING Heat will increase productivity
. . . because

it plays no favorites!

You know how it is in some plants (perhaps in yours) . . . some lucky worker is located just *between* the steady fixed streams of hot air from the unit heaters, and he's the envy of the rest of the crew. Especially of those directly in the path of the hot air streams.

But in the plant heated by Wing *Revolving* Heaters, *everybody*'s lucky . . . these heaters play no favorites. There *are* no steady streams of hot air. The slowly revolving outlets keep the air streams moving constantly, creating a gentle, warm refreshing breeze that keeps everybody happy and productive.

You ought to find out what they can do for you. Send for a bulletin.

L. J. Wing Mfg. Co. 140 Vreeland Mills Road · Linden · N. J.
DIVISION OF AERO SUPPLY MFG. CO. INC.
In Europe: WANSON, Haren Nord, Brussels, Belgium

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Revolving
HEATER

Wing
·REVOLVING·
UNIT HEATERS

FANS • UNIT HEATERS • DRAFT INDUCERS • BLOWERS • TURBINES

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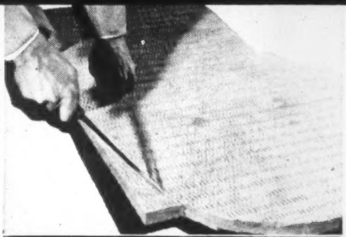
BALDWIN-HILL

DUCT INSULATION

30,000 bd ft of B-H DUCT INSULATION installed at Graflex, Inc., Rochester, N. Y., simplified and reduced cost of insulating heating and cooling duct system.

Engineers: Eggly-Furlow, Philadelphia, Pa. Insulation Contractor: E. J. Eddy Co., Inc., Rochester, N. Y. General Contractor: John B. Pike & Son, Inc., Rochester, N. Y. Heating and Air Conditioning Contractor: A. Burgart, Inc., Rochester, N. Y.

MEETS MULTIPLE REQUIREMENTS . . .



B-H DUCT INSULATION is easily cut and fitted to irregular flat shapes.

Curved surfaces effectively insulated by scoring and bending B-H DUCT INSULATION.

Low Installed Cost—High Insulating Efficiency—Low Operating Expense

Easy cutting, fitting and application, even to curved surfaces, add up to provide a low installed cost of B-H Duct Insulation. It proves easier and quicker to apply than semi-rigid materials adapted for the purpose.

B-H spun mineral wool Duct Insulation has a high thermal efficiency which lowers air conditioning and heating costs. Here at Graflex, Inc. this insulation maintains uniform temperature from beginning to end of these long run ducts. Plain duct insulation was used because a suspended ceiling, installed after this picture was taken, creates a cooling and heating plenum. Air in the plenum is conditioned to keep humidity low, eliminating need for a vapor barrier over the insulation. B-H Duct Insulation is available also with factory-applied vapor barrier, and coated to prevent fiber entrainment.

More information available in brochure suggesting methods of application. See Sweet's Engineering File for other B-H insulating products.

BALDWIN-HILL COMPANY

1710 Breunig Avenue, Trenton 2, New Jersey

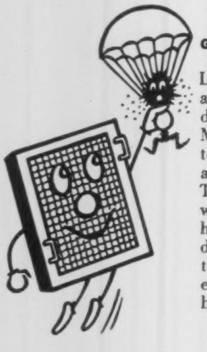
Kalamazoo, Mich. . . . Huntington, Ind. . . . Temple, Tex.

AIR-MAZING FACTS

BY O. SOGLOW

UP IN THE AIR! A resourceful painting contractor in France found a new way to reach sky-high ceilings. He built a platform on a 24-foot balloon, inflated it and up he went. Designers needn't be "up in the air" when it comes to tough jobs of removing harmful air-borne particles . . . there is an Air-Maze filter *engineered* to fit every filtering need.

COUNTER ATTACK! Dust falling on counter display can cost stores thousands of dollars in shopworn merchandise. Leading stores stop dust, dirt and even stop smoke with Electromaze electronic air filters. Can be serviced automatically. New G-E selenium rectifier eliminates tube maintenance.



GRABS AIR-BORNE GREASE! Leading restaurants and hotel kitchens depend upon Air-Maze Greastop filters to trap grease, dirt and dust in the air. They're the proven way to reduce fire hazard in exhaust ducts. In addition they cut duct cleaning expense and protect blowers and motors.

FOR AIR CONDITIONING AND VENTILATING EQUIPMENT, ENGINES, COMPRESSORS *or any device using air or liquids* — there is an Air-Maze filter engineered to solve each filtering problem. For new all-line catalog, write Air-Maze Corporation, Dept. D-2, Cleveland 28, O.

AIR-MAZE

The Filter Engineers

AIR FILTERS • SPARK ARRESTERS • LIQUID FILTERS
SILENCERS • OIL SEPARATORS • GREASE FILTERS

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TAKE THE GUESSWORK OUT OF ESTIMATING

High Velocity Air Movement Systems

IN ONE COMPLETE PACKAGE

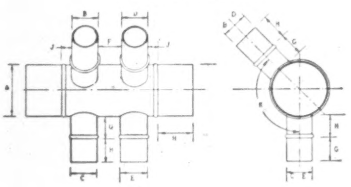
1 SPIRAL *Lockseam* PIPE

Spiral pipe, matched fittings and sound absorbers . . . all custom made to cut costs . . . quicken and pin-point estimates. Next time, specify United's spiral pipe fittings and sound absorbers . . . all in one complete package.

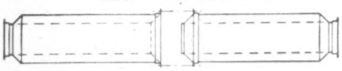
Spiral Pipe Standards and Sizes

• 26 gage zinc-coated steel — diameters 3" through 8" • 24 gage steel—9" through 22" • Standard length 12'—lengths to 20' if required • Available in any specified metal 20 to 30 gage

2 MATCHED FITTINGS
AVAILABLE FOR EVERY SPIRAL PIPE DIAMETER



3 SOUND ABSORBERS
HIGH PRESSURE
LOW FRICTION LOSS

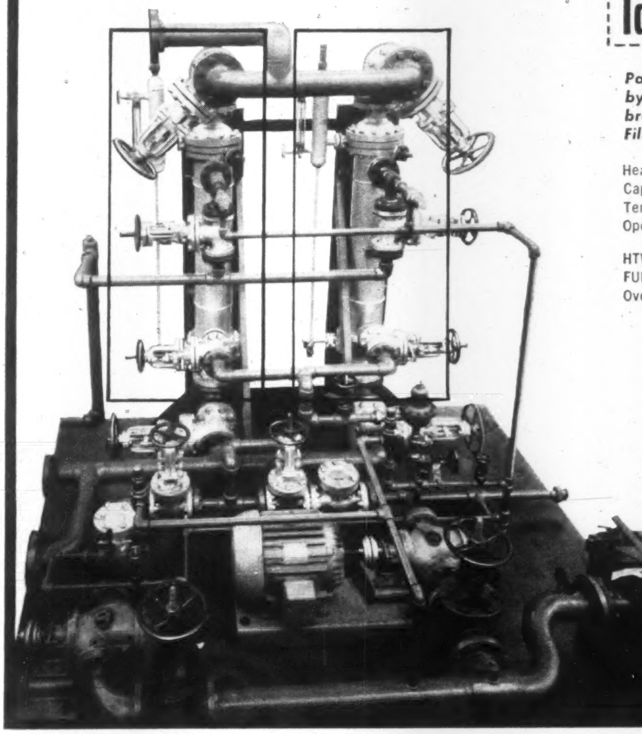


Write For Free Catalog
Showing Detailed Specifications and Applications

UNITED
Sheet Metal Co.

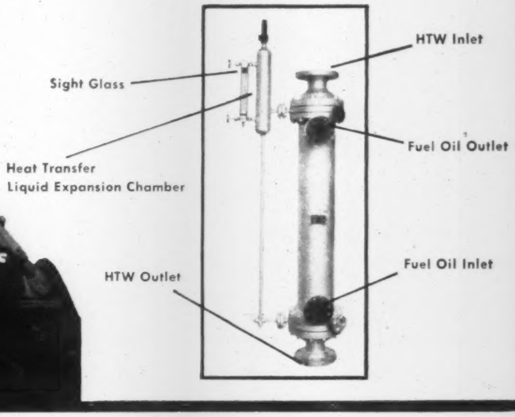
550 S. Drexel Ave. Columbus 9, Ohio
Telephone: BElmont 5-3495

Idea no. 2 from Paracoil



Partial view of pump and heater set fabricated by Peabody Engineering Corporation, Glenbrook, Connecticut, utilizing two "Thermo-Film" Fuel Oil Heaters of these specifications:

Heater Size	FF-48 HTW "Thermo-Film"
Capacity	7500 lbs. No. 6 oil per hour
Temperature Rise	80°F to 210°F
Operating Pressures	300 psi, water side 315 psi, oil side
HTW Flow Rate	100 GPM at 370°F
FULL ASME Code Construction	
Overall Heater Dimensions	15" x 6'-6"



How to use High Temperature Water directly in a #6 oil heater...without danger of system contamination!

The Problem

The pre-heating of #6 fuel oil with High Temperature Water to provide adequate oil temperature and eliminate possibility of leakage of fuel oil into the HTW stream.

Leakage of fuel oil into the HTW stream would result in contamination of the system and could cause serious and costly damage to the boiler and the entire system.

The isolation of the fuel oil heaters can be accomplished by several methods. For example, the HTW stream may be passed through an evaporator to supply steam for use in a steam-type fuel oil heater. Or, the HTW stream may be passed through an intermediate water-to-water exchanger to heat a secondary water stream circulated through a water-type fuel oil heater.

In both of these systems, the HTW stream is safely isolated from the fuel oil heater by an intermediate secondary circuit. But effective as these methods are, they both require a minimum of two heat exchangers, additional space and additional connecting piping, regulators, level controls, etc.

A New Solution

Now for the first time the Paracoil "Thermo-Film" Fuel Oil Heater furnishes the optimum solution to the problem. **In a single exchanger** the "Thermo-Film" Heater provides adequate oil temperature, isolation of the HTW circuit from the oil circuit, a reduction in space requirements, simplicity of operation and substantially lower initial installation cost. A number of double tube elements are enclosed within the heater shell providing three circuits: the primary HTW circuit, an intermediate heat transfer fluid circuit, and the oil circuit.

The heat flow path is from the HTW to the heat transfer fluid to the fuel oil. In the rare event of an oil tube failure, the free oil cannot contaminate the HTW stream as it becomes trapped in the intermediate space containing the heat transfer liquid, and gives warning to the operating personnel by rising in the indicating gauge glass at the expansion chamber.

Your inquiries for Paracoil "Thermo-Film" applications to HTW systems are invited.

DAVIS ENGINEERING CORPORATION
30 Rockefeller Plaza, New York 20, New York • Circle 6-5650

CUT ALONG DOTTED LINE AND SAVE

Men
who know
specify
GACO

to stop corrosion in
cooling tower drip pans

GACO
THE MARK OF CORROSION PROTECTION

You don't have to be a hot engineer to know that cooling tower drip pans corrode rapidly. That's why men who know—the supervising engineer of the great new Socony Mobil Building in New York, for instance—specified GACO to avoid pan replacement every few years.

Here's how to stop corrosion in drip pans: Apply GACO N-200 liquid neoprene lining—a tough, flexible coating that adheres strongly to metal . . . will not crack or chip . . . and is virtually unaffected by salt spray, sunlight, or corrosive atmospheres. For piping and structural steel use GACO N-700 liquid neoprene maintenance coatings.

GACO coatings are performance-proven on cooling tower installations in The Socony Mobil Building, Radio City, and Ohrbachs in New York—to mention just a few. *Write for complete information*

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Just One Low-Cost Premium For Life—
A Babbitt SPROCKET RIM

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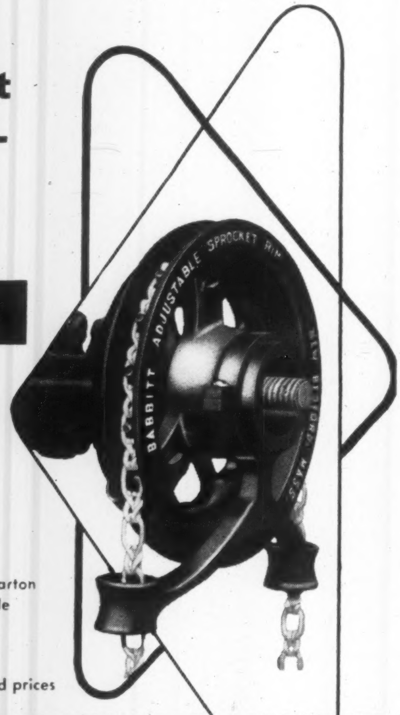
Adjustable
SPROCKET RIM
with Chain Guide

- Simplifies pipe layout
- Fits any size valve wheel
- Easy to install and operate
- Operates any valve from plant floor
- Time and money saving fixture
- No maintenance, first cost only cost
- Packed, completely assembled, one to a carton
- Hot galvanized, rust-proof chain available for all sizes
- Easy to follow instructions with each unit
- Your supplier carries complete stocks
- Write for new descriptive catalog sheet and prices



Babbitt STEAM SPECIALTY CO.

8 BABBITT SQUARE, NEW BEDFORD, MASS., U.S.A.

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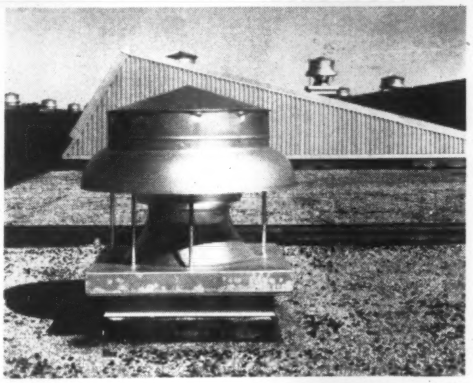
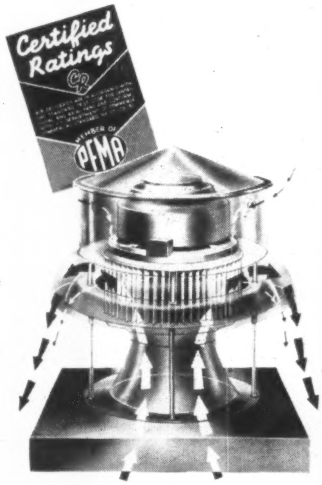


Architects and Engineers: Johnson and Johnson
Chicago

Amerock Corporation has come to the front as a cabinet hardware manufacturer in less than three decades. From a modest start in 1929, it is the world's largest maker of cabinet hardware. 2000 employees produce 5000 different items under the Amerock brand name.

Gallaher Air-Vans® *Solve Ventilation Problems in 10 Acre Amerock Plant at Rockford, Illinois*



150 CFM to 65,000 CFM—up to 4" S.P. Certified Ratings.

When Amerock Corporation, Rockford, Illinois, built its new plant—almost 10 acres of floor space under one roof—they had the problem of general ventilation and heat removal.

112 Gallaher Air-Vans and Air-Max Power Exhausters were specified for the job. When all units are operating, they change the air at the rate of 792,000 cubic feet per minute, efficiently ventilating metal treating, plating and high heat areas of the huge plant.

If you are looking for economical, efficient ventilation, it will pay you to get the full details on Air-Vans. Gallaher units are shipped totally assembled, ready for installation. They are quiet operating and are available in special metals for special applications. Patented features include a high efficiency scroll design and protective air seal-off. Capacities range from 150 CFM to 65,000 CFM, and up to 4 inches S.P.

For full information write

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Export Office: 306 Paul Bldg., Utica, N. Y. Cable: Keiserquip

Over 150 tons of G-E Zone-by-Zone Air Conditioning serve the entire Louise Obici Memorial Hospital in Suffolk, Va. In all, 26 General Electric Packaged Units were installed with no major alteration or structural changes.

GENERAL ELECTRIC ZONE-BY-ZONE AIR CONDITIONING

Selected as most practical method for modern hospital

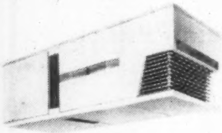
Nobody would ever guess that General Electric Air Conditioning was installed *after* this hospital was completed—so well concealed are the quiet General Electric Units.

Zone-by-Zone Air Conditioning is also a sure way to solve budgeting problems. It is easy to install—no costly interruptions—no major alterations—no heavy initial outlay. Operation is economical and space problem is minimized. Indeed, more and more architects are specifying General Electric Zone-by-Zone Air Conditioning as the most practical answer for every requirement. General Electric Company, Commercial and Industrial Air Conditioning Dept., 5 Lawrence St., Bloomfield, N. J.

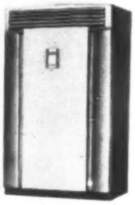
Linen closets house and conceal compact General Electric Air Conditioners providing service to another area.

Basement storeroom also houses General Electric Units. These four units serve a section of first floor wing.

Installation by
Mechanical Engineering Corp., Norfolk, Va.



Ceiling-mounted units use no floor space—air-cooled and water-cooled.



Floor-mounted units may be stationed in or away from area served.

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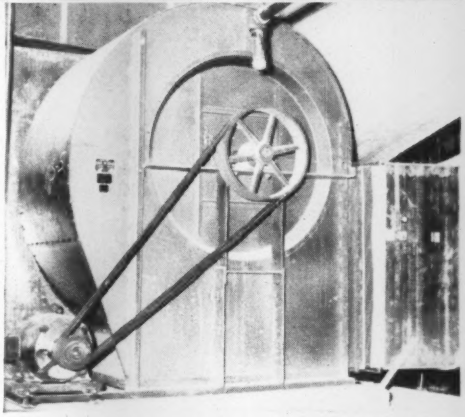
Another Coliseum Chooses Clarage Air Handling and Conditioning Equipment

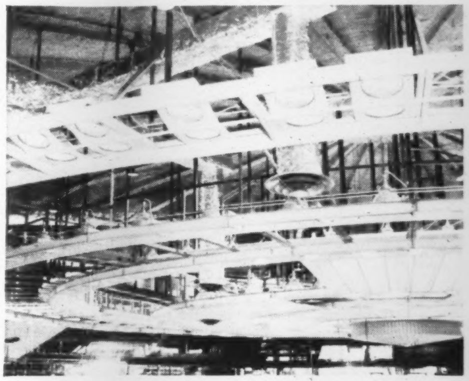
IMPRESSIVE in the Texas tradition is the new Dallas Memorial Auditorium. Its circular arena building, reportedly the largest cement domed structure in the nation, connects with a convention building and lyceum, shown on the right above.

Air handling throughout this vastness was assigned to Clarage equipment — Multitherm conditioning units, Unicoil sprayed coil units, giant system fans, ventilating sets.

Here again, as in New York's new Coliseum and other prominent buildings of all types, Clarage equipment was chosen for its recognized ability to perform quietly, economically, and dependably. CLARAGE FAN COMPANY, Kalamazoo, Mich.



One of several Clarage Type NH fans located in the outer ring which encircles the Coliseum's dome.



Arrangement of air conditioning ductwork, viewed before completion of the ceiling.

CLARAGE

. . . dependable equipment for making air your servant

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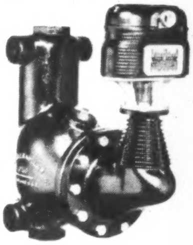
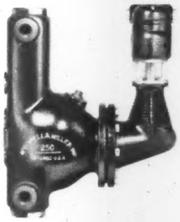
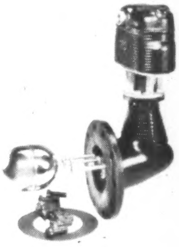


No. 192—For fire-tube boilers with pressures up to 250 psi. Has integral water column for gauge glass and try-cock trim. Holds minimum efficient water level.



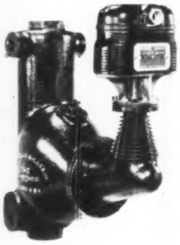
No. 292—For water-tube or high set boilers where more visible water in gauge glass is desired. Has integral water column. For pressures to 250 psi.

No. 92A—Has lower side equalizing connection. Same features as all 92 Series: operating levels easily adjusted, ample float clearance, low switch terminal temperature, etc.

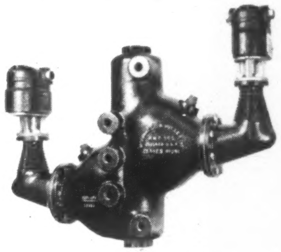


No. 92-HD—For flange mounting on tanks or water columns. For pressures up to 250 psi. No. 91-HD also available for pressures up to 150 psi.

No. 91—For any size boilers or tanks with pressures up to 150 psi. Used on boilers equipped with separate water column. Same repulsion magnetic switching for positive operation.



No. 191—For boilers up to 150 psi. Integral water column. All 91 and 92 Series controls have two single-pole double-throw switches. Ideal for motor operated valve control.



No. 291—For applications requiring very wide operating differentials. Pressures to 150 psi. Commonly used with duplex pumping arrangements.

Write for Bulletin L-123

Has the whole story of the McDonnell 92 and 91 Series controls in a boiled-down usable form. Contains service recommendations, installation drawings, wiring diagrams, etc.

Underwriters Listed • C.S.A. Approval No. 5545.

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